

# THE STUDY OF ANCIENT TERRITORIES CHERSONESOS & METAPONTO



2004 ANNUAL REPORT  
INSTITUTE OF CLASSICAL ARCHAEOLOGY  
THE UNIVERSITY OF TEXAS AT AUSTIN

ISBN 0-9748334-1-X

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The director and staff of  
The Institute of Classical Archaeology  
gratefully acknowledge the extraordinary support  
for operations and projects  
provided by  
The Packard Humanities Institute

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*For additional support, special thanks to:*

#### Non-profit Organizations

The Brown Foundation  
The James R. Dougherty, Jr., Foundation  
The Liss Foundation

The Rachael & Ben Vaughan Foundation  
The Trust for Mutual Understanding

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Embassy of the United States of America in Ukraine  
Ministero dei Beni Culturali ed Ambientali  
Museo Archeologico Nazionale, Metaponto

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#### Individuals

Daniel and Nancy Balz  
Jane Bedichek  
L. Dayton Blanchard  
Mary Carlyle Carter  
Mary Leaphart Carter  
Dr. William L. Carter  
Judy Coker  
Sandra Heinrichs  
Mr. and Mrs. Marshall Johnson  
Warren Larson  
Dr. and Mrs. Henry Liss  
Mary Link Malone

Bert Michelsen  
Mariann Micsinai  
Kathleen Monahan  
Mr. and Mrs. John O'Connor  
Dr. Maconda Brown O'Connor  
Ralph S. O'Connor  
Dr. David and Mrs. Jeanne Renison  
Marla Rolén  
Elizabeth H. Tracey  
Mr. and Mrs. Ben F. Vaughan III  
William Willis  
Nancy C. York



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## THE INSTITUTE OF CLASSICAL ARCHAEOLOGY

### MISSION

The Institute of Classical Archaeology (ICA) is an Organized Research Unit of The University of Texas at Austin. In order to study, document, and preserve sites, monuments, and artifacts of past life for present and future generations, we conduct archaeological fieldwork and training in ancient Greek rural territories on the Black Sea and the Mediterranean. We engage in interdisciplinary research and publication and provide technical assistance and expertise for cultural heritage management.

### RESEARCH FOCUS

ICA's research focuses primarily on the *chorai*, or agricultural territories, that surrounded and supported ancient Greek colonial cities. Our two primary sites of research are the chora of Metaponto on the southern coast of Italy and the chora of Chersonesos on the northern coast of the Black Sea in Crimea, Ukraine. Both settings offer remarkably well-preserved ancient rural landscapes, once densely occupied by farmers and still containing abundant evidence of their homes, burial grounds, and places of worship. Because their locations were strategically important, they also contain archaeological remains from the Roman through Byzantine eras. Through its research, ICA contributes to a fuller understanding of the settlement, economy, and culture of this previously neglected rural dimension of early western civilization. Metaponto and Chersonesos provide a unique chance to compare rural *chorai* at opposite ends of the colonial Greek world, as well as a valuable opportunity to train students, foster exchanges, and generate international collaboration and good will.

### ADJUNCT ORGANIZATIONS

The Center for the Study of Ancient Territories (U.S.A.), *Pidtrymka Chersonesu* (Ukraine), and the *Centro di Agroarcheologia Pantanello* (Italy) are nonprofit organizations founded to support the mission and goals of ICA. Their special focus is expanding international cooperation for ICA's projects and ensuring cultural awareness and compliance with local laws.

## 2004 IN REVIEW

Joseph Coleman Carter

*Director, Institute of Classical Archaeology*

As I look back over 2004, its challenges and achievements, I can't help thinking back to 1974 when ICA came into being, on a windswept hilltop in Southern Italy, in the chora of Metaponto. Its potential was not yet well-defined but the future offered promise. The vision which became the study of ancient territories grew step-by-step. With the publication of the first of the definitive reports on the Chora of Metaponto, the volumes on the necropoleis, ICA's role in the study of the rural population in the Classical World was unquestionably established.

The history of ICA entered a new phase with a grant from the Packard Humanities Institute (PHI) in 1999. The projects in Italy and those at Chersonesos in Ukraine started a period of growth which continues to this day. The projects, which had always been international in their personnel, became truly global in their scope. Who would have dreamed in 1974 that ICA, with PHI's sponsorship, would be bringing into existence the world's first archaeological park of the ancient Greek Chora in the colony of Chersonesos, at the time one of the most remote and secret places of the Cold War era?

PHI support has changed ICA, and it is no exaggeration to say that it is propelling innovation in the field of archaeology in Ukraine and in Southern Italy.

The annual reports of the Institute of Classical Archaeology and its affiliates normally begin with an "Executive Summary," but this was not a normal year for the director. In its place you will find an appropriately brief introduction to the various projects undertaken by ICA teams during 2004. For the first time in the 30 years of ICA's existence, the author was not in the field. In his place, the individual team leaders had the responsibility and can claim the credit for the highly successful campaigns in Chersonesos and Metaponto.

In 2004, ICA had as field director Dr. Adam Rabinowitz, a 2004 PhD. who came to us from the excellent program in Classical Archaeology at the University of Michigan. Joining the ICA

staff at mid-year, he rapidly adjusted to the varied demands of the job as assistant director for Chersonesos, and began to quickly make positive contributions to the ICA program that went well beyond directing the excavation.

Excavation, while one of ICA's many research activities, is inevitably the most visible and easily understood. It is natural to begin this review here. The excavation in 2004, a joint project of ICA and the National Preserve of Tauric Chersonesos (NPTC) and co-directed by Larissa Sedikova and Adam Rabinowitz, expanded what was begun in 2001 (collaborating with the University of Lecce), in the southeastern residential quarter of the city. In this region, as in others, the 13<sup>th</sup> century AD occupation levels of the city have been remarkably well-preserved as this report will illustrate. The city and its adjacent chora, or territory, are in all periods part of a single settlement. So, though ICA has focused to a large degree on the relatively unstudied chorai of Greek colonial cities and their successors, it is natural to view the unit as a whole. The process of doing this began in the southeastern quarter and continued in 2003 in the southwestern quarter (see *Annual Report* 2003).

The discoveries in the city, like those in the chora, extend our knowledge by taking into consideration the organic remains of past life, namely that of plants, animals, and humans. This sort of evidence is present on most sites, but is rarely as well preserved as it is at Chersonesos. The human remains from the graves in the chapel of the urban insula, as Renata Henneberg's and Denis Ponomarev's analysis showed, are particularly revealing about the state of health of the medieval population of Chersonesos. The discovery of endemic treponemosis in the population follows at a distance of 15 years on Maciej and Renata Henneberg's ground-breaking discoveries of a similar condition in the Greek population of Metaponto in the 6<sup>th</sup>–3<sup>rd</sup> centuries BC.

One of the strengths of ICA's research is our successful multidisciplinary approach to basic field work and interpretation. The scientists' reports are not appendices to an archaeological report, but an integral part of it. We have always worked, in Italy

and Ukraine, with international and local experts, not only because they have often been leaders in their fields, but also because they know European materials first hand.

The multidisciplinary approach was much in evidence in all our work in 2004, and its importance continues to grow as we plan for the future. The plant and animal remains from the city and chora are currently objects of a major campaign of research for publication, as the reader will note. This research continues ICA's first palynological work from 1977, and it parallels the tradition of paleobotanical research by the National Preserve and its collaborators that began in the 1970s.

Currently involved are our colleagues from the Academy of Sciences in Kyiv, Galina Pashkevich, (who continues a tradition of paleobotanical research at Chersonesos begun by Zosia Yanushevich) and by Oleg Zhuravlev, who is currently studying the faunal remains from the insula in the city. The faunal remains from Bezmyannaya in the chora are the purview of Aleksey Kasparov, of the Institute for the Study of Material Culture in St. Petersburg. In the desire to understand the life of city and chora in all the aspects where archaeology can provide evidence, ICA's Chersonesos projects bear a strong resemblance to those begun in 1974 at Metaponto. Together they provide a unique perspective on rural life over the long history of two geographically separated areas where Greeks founded colonies.

The training of young archaeologists from the many countries at various stages of their careers is one of the top priorities of ICA. Students have been involved in our research projects at all levels, encouraging their growth academically and professionally. Annually since 2001, an group of six students from Kyiv Mohyla Academy University has participated in excavation and conservation under ICA supervision at Chersonesos. These students are chosen for their strong performance in that University's masters program, the only graduate program currently in Ukraine.

The work of one of these students, Evelina Kravchenko, is included in this annual report. It is a part of her long term research, facilitated by ICA, on the interaction of Greek colonists with the pre-existing native population of south-western Crimea, known by the Greeks as Taurians. Eventually, it is hoped that this will develop into

a larger collaborative project with our Ukrainian colleagues.

Long term projects of ICA at Chersonesos that are near completion include research for publication of the sites we have excavated in the chora. Andrei Opait worked in 2004 on the pottery from Bezmyannaya, after completing his study of the storage ware and amphorae from the Greek farm site 151. At the same time Phil Freeman carried out a limited excavation at Bezmyannaya—with our colleague Galina Nikolaenko of the Preserve—to answer outstanding questions about the site in preparation for his more detailed study.

Among the holdings of the Preserve's collection—now designated as a national treasure by the Ukrainian government—are the unique painted grave monuments from the early Hellenistic (4<sup>th</sup>–3<sup>rd</sup> centuries BC) necropolis of Chersonesos. From the very beginning, in 1992, of ICA's collaboration with the Preserve, these stelai have been the objects of intensive study which will add significantly to our knowledge of Greek art. For a number of years, the project was carried forward by the director and Chris Williams who prepared the initial catalogue. Then in 2000 we were joined by Richard Posamentir, who has made great strides in identifying numerous new grave monuments and deepening the study with his expertise in the use of color in Greek art. In 2004, a team of architects under his supervision documented the architectural fragments with accurate, highly-detailed drawings.

At the same time, Chris Cleere and his team of conservators began to clean pieces of fragmented monuments and join them together (Fig. 1). This was part of the comprehensive conservation program for the Preserve sites in the chora and city begun in 2003. (See reports on these activities, beginning on page 39.)

Many changes have taken place since Ukrainian independence in 1991, and the pace has only accelerated since those early, heady years. However, more changes need to take place for the country to emerge as truly independent, unified, and strong, as the Orange Revolution of 2005 has dramatically underscored. The wiser leaders of the country have understood the fundamental role that culture has to play in creating the new nation and they understand that though there was much good in the way the cultural institutions were managed

before independence, changes and improvements need to be made to bring these institutions up to international standards.

ICA has tried to assist these enlightened leaders by providing access to international experts in cultural resource management and preservation, led by Henry Cleere and Giora Solar, as well as Taissa Bushnell (who saw the challenge and responded by obtaining a degree in archaeological site management from the University of London in 2004). In 2000, the Preserve, with ICA's support, was able to thwart attempts to limit public access to Chersonesos and its monuments; while our effort was successful, vigilance is necessary to protect the public's right to enjoy this national treasure.

In the past, the economy of Sevastopol was based on the city's status as the headquarters of the Black Sea Fleet, one of the major naval bases of the Cold War era. Now with the de-nuclearization of Ukraine (1993) and the division of the Fleet between Russia and Ukraine (1997), the region has been forced to diversify its economy, and the most viable new industry is proving to be tourism. This, in turn, has put pressure on obviously attractive seaside real estate on the Heracleian Peninsula, where many unique ancient monuments of Greek rural life still survive.

The idea of creating an Archaeological Park of the Ancient Greek Countryside was first proposed in 2000, as a way to preserve this precious cultural landscape. Through the foresight and generosity of the Packard Humanities Institute and the personal interest of David W. Packard, the park has been a major project of ICA's since that time,

and a theme that has united ICA's efforts, in research, excavation, conservation, and publication (*Crimean Chersonesos*, 2003, for example), as well as preservation and management.

In 2004 important steps were made toward the goal of a park, ranging from a conference in Chersonesos in May (see Taissa Bushnell's report, page 69), to the decision by the city council in November to pass title to approximately 400 acres of the well-preserved ancient chora on the Heracleian Peninsula to the National Preserve, for the express purpose of creating an archaeological park. This marks, as the city officials noted, a recognition by the municipal authorities of the future recreational value of these cultural properties. This is the position also taken by the Ukrainian government in Kyiv. ICA efforts in 2004 concluded with a visit to Sevastopol by the director, Taissa Bushnell, and the former U.S. Ambassador to Ukraine, William Green Miller, and his wife Suzanne, for meetings with the mayor-governor, and to Kyiv for meetings with the Minister of Culture. This mission concluded propitiously on the eve of the November election that set in motion the January revolution.

ICA's projects in Southern Italy at Metaponto and Croton sometimes pale in comparison to those of Chersonesos in terms of drama and geopolitical interest, but in 2004, as usual, they produced substantial scientific results. Efforts focused on the publication of the Metaponto survey, a study of the chora of Metaponto that began in 1981 and continues to the present. The accomplishments of 2004 were registered in Austin in our offices at MCC and contemporaneously in our laboratory



Figure 1. Members of the monument conservation team prepare stelai fragments for joining.



in Metaponto, as Alberto Prieto, working with a talented team of collaborators, assembled the massive database of the survey. In Austin, Alberto, Peter Dana, and the director, in daily sessions incorporated these data in a GIS, programmed by Peter and Alberto, to respond to complex questions about the historic settlement of the chora, particularly in its Greek phase (7<sup>th</sup>–1<sup>st</sup> centuries BC). (See their reports, beginning on page 73).

A four-day international conference in Italy on the Metaponto Survey, organized by Alberto, highlighted some of the achievements of this long-term project and provided a forum for discussion and feedback from our colleagues. The invited guests, besides the ICA team and consultants, included leaders in the field of survey archaeology in the Mediterranean, John Bintliff (Leiden), Lin Foxhall, (Leicester), John Robb (Cambridge), Giana Ayala (Sheffield), and our long-time collaborators in Italy, Prof. Liliana Giardino (Lecce) and Dr. Antonio De Siena, Director of the Museo Nazionale Metaponto. Intensive discussions held for four days at ICA's Pantanello conference center, were stimulating for all involved and a great joy and satisfaction for the director (much of whose time is spent in necessary but less intellectually stimulating tasks). The presentations were structured, the discussions lively, wide-ranging, and beneficial, and the participants felt an atmosphere of collaboration and trust. ICA data and tentative conclusions were out for all to view. The archaeological material was on display in the laboratory, and the sites of the city and the chora were visited with the experts. As Antonio De Siena expressed at the dinner following the closing session, this was truly an occasion without precedent in Southern Italian archaeology. We hope to repeat this again in the future and to establish a new precedent in the sharing of data and ideas.

The contributions of ICA to archaeology and to the region were recognized in 2004 by naming the director recipient of the *Saturo d'oro*, awarded annually for distinguished archaeological achievement in Magna Graecia. (Unfortunately, I was unable to attend the ceremony for reasons of health.) Previous recipients include Prof. Dinu Adamesteanu (Archaeological Superintendent of Basilicata) and Prof. Dieter Mertens (Director of the German Archaeological Institute in Rome).

The director was invited to give the keynote address at the 39<sup>th</sup> International Congress on the History of Medicine in Bari and Castellaneta, Italy, in September. Prof. Maciej Henneberg agreed to be a substitute speaker, on the theme of medicine and archaeology, for which he is eminently well-qualified. Renata Henneberg gave a major paper on her research on skeletal remains from Metaponto, with special emphasis on teeth.

Reviewing the year, we at ICA view the achievements of 2004 with satisfaction and pride (though not too much of either). What has emerged—and, we hope, continues to emerge in years to come—is a clearer vision of our mission, and solid accomplishment in the form of publications and goals achieved. Looking forward, see continued advances in the uses of digital technology. In this regard, a new project by the ICA team, in collaboration with the School of Information and the General Libraries of the University of Texas, involves the digitization of all our data. These digitized archives will not only preserve the large variety of information ICA has accumulated, but it will enable its sharing with our team members, students, and other researchers in the field. Adam Rabinowitz has made this a priority in his work for ICA. It will be a major advance in the field of archaeology. I shall rest easier knowing 30 years of fieldwork by ICA, much of which individual team members carried forward with considerable sacrifice, will be available to future generations to study and use.

### In Appreciation

It is impossible to adequately acknowledge the extraordinary sponsorship by the Packard Humanities Institute. This support has made it possible for ICA and its collaborators to pursue and publish broad areas of research, expanding the limits of traditional archaeology. Because of this sponsorship, ICA has been able to consult and involve professionals and students from around the world, to their benefit and that of world culture.

Much gratitude is due also to The Brown Foundation, the James R. Dougherty, Jr., Foundation, the Rachael and Ben Vaughn Foundation, the Liss Foundation, the Trust for Mutual Understanding, as well as the numerous individual donors listed inside the front cover. These contributions have given us help and encouragement, ensuring the continuation of our work.

## EXCAVATIONS IN THE SOUTH REGION OF CHERSONESOS

Adam Rabinowitz

*ICA*

Larissa Sedikova

*National Preserve of Tauric Chersonesos*

As those who have glanced at previous numbers of the *Annual Report* may know, the urban area of Chersonesos presents a rich and full picture of the development of a Greek, Roman, and Byzantine town. Work has been carried out in the center of the city for over a hundred years, leaving us with substantial knowledge of its various phases and, most strikingly, with a detailed picture of daily life in this prosperous city at the time of its destruction in the later 13<sup>th</sup> century. The historical record confirms the importance of Chersonesos during the Middle and Late Byzantine periods, when the city served both as the seat of one of the administrative *themata* of the Byzantine Empire and as a crucial connection in trade between the Aegean, northern Europe, and the eastern steppes. Written sources say relatively little, however, about the quotidian affairs of ordinary people in such a city, and the well-preserved remains of the last phase of Chersonesos have an enormous contribution to make to our knowledge of Late Byzantine domestic and commercial life.

Excavations in the peripheral South Region of the city, begun by Dr. Larissa Sedikova in the 1990s and continued in collaboration with ICA and Prof. Paul Arthur of the University of Lecce in 2001 and 2002, were intended to clarify urban development and patterns of activity at a distance from the heart of the town. These investigations centered on a large Roman cistern built against the city wall and on a residential block separated from the cistern by the *plateia* (main street) of Chersonesos. The cistern had fallen out of use at some time before the 9<sup>th</sup> century AD, at which point it was filled with household refuse. The investigation of the southeast end of the residential block revealed a series of independent complexes built around a central courtyard and sharing a small chapel that lay between the court and the street. The 2001 and 2002 campaigns focused on the courtyard, in which industrial activity related to iron working seems to have taken place, and on one of the tombs in the mortuary chapel attached to the block. They also uncovered most of the complex along

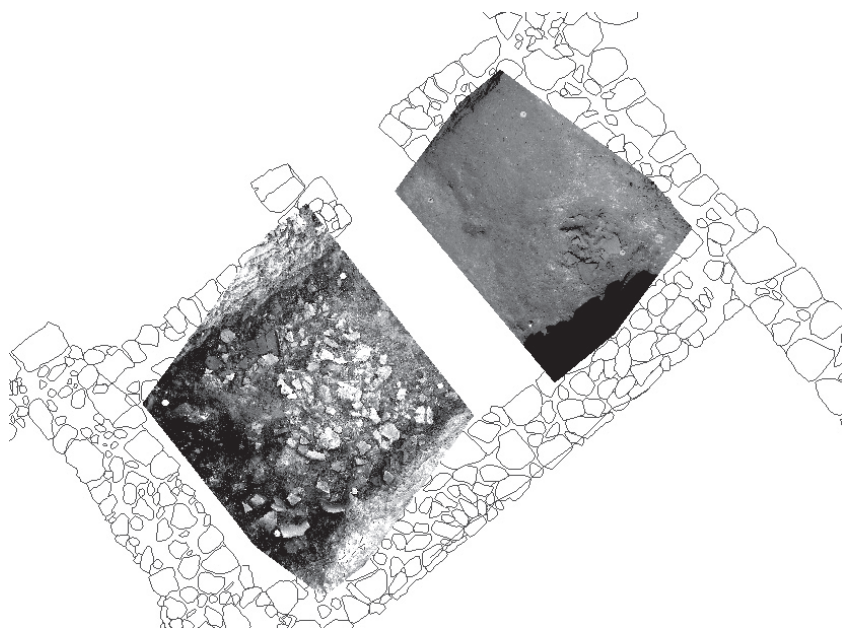


Figure 1. The integration of photographs and GIS-based plans: georeferenced photos of layers in room 35.



the southwest side of the courtyard (complex 1). The most striking feature of this building was a large, square room opening onto the street. This room was furnished with a number of features related to cooking and to the storage of foods and liquids, suggesting to the excavators that it may have served as a sort of tavern. Several of the other rooms in the complex seem to have been used for storage, and evidence for an upper floor suggests that private, domestic space may also have been included. The finds, however, were not exclusively domestic in character: in one of the storerooms, among the broken storage vessels, was found an iron processional cross with silver inlay.

Excavations resumed in the South Region of Chersonesos in the summer of 2004, after a hiatus for conservation efforts in 2003. The project, now a direct collaboration between ICA and the National Preserve, had as its main goal for this season the investigation of at least two structural complexes along the northeast side of the courtyard. We hoped that these structures would provide information about the phasing of Byzantine construction in this area and about patterns of daily activity, as well as a better understanding of the development of this area from the Greek period on. We also planned to open a second tomb in the mortuary chapel to

increase our knowledge of the human population of this area. Finally, we set out to develop a comprehensive and efficient system for the collection, digitization and manipulation of spatial and excavation data, building on foundations laid by the efforts of the Lecce team in 2001 and 2002. To this end, our GIS specialist Jessica Trelogan and our digital documentation consultant Stuart Eve worked together to build a new and more streamlined database in Microsoft Access. Not only did this database correspond more closely to the sort of data we actually collected in the field, but it made possible the direct integration of contextual and small-find data with our GIS system. We also began to experiment with more comprehensive collection of spatial data, including the use of geo-referenced overhead photos to plan complicated deposits (Fig. 1) and the creation of microtopographical maps of individual layers .

By the time the excavation had gotten into full swing, our contingent of specialists and conservators was nearly complete and ready to go. Zooarchaeologist Oleg Zhuravlev finished with the faunal material from the previous seasons about a week into the excavation and began to study the animal bones we were in the process of collecting. At around the same time, our two



Figure 2. Renata Henneberg and Denis Ponomarev excavate remains from Tomb 2.

object conservators, Dana Goodburn Brown and Steve Miller, arrived and settled in, and Denis Ponomarev and Renata Henneberg, our physical anthropologists, began to excavate the human remains in the second tomb in the church. (Fig. 2). Galina Pashkevich, our paleobotanist, arrived about a week later, just in time to begin the flotation and study of the large number of soil and organic samples that we had already collected.

The interdisciplinary strengths of the team described above were well suited to the diverse material we uncovered this year. In addition to the large quantities of ceramics, bones, and metal objects that we had expected to find, we made several surprising and exciting discoveries. The two most important involved the earliest and the latest phases of activity in the South Region. At the bottom of a Byzantine-period pit in the courtyard, we came across massive stone slabs that we suspect to be part of a monumental paving or construction of the Greek or Roman period. And, at the other

end of the chronological spectrum, we found that the fire that had consumed much of the city in the later 13<sup>th</sup> century had carbonized and preserved a large quantity of wood and organic material in the rooms at the east corner of the block. One of these rooms served as a storeroom, perhaps for a small commercial establishment, and some of the pithoi and amphorae that crowded the space still held the charred remnants of their original contents. In addition, as the excavation was ending, we found the skeleton of an old woman lying unburied in the street below the collapse of the buildings. This discovery suggests that the general conflagration was not accidental, but part of a larger trauma, and may confirm the idea that the beginning of the end of Chersonesos was the work of the Golden Horde.

Excavation and research projects scheduled to take place in the summer of 2005 will gather further information on these discoveries, and we hope that we will soon be able to provide decisive

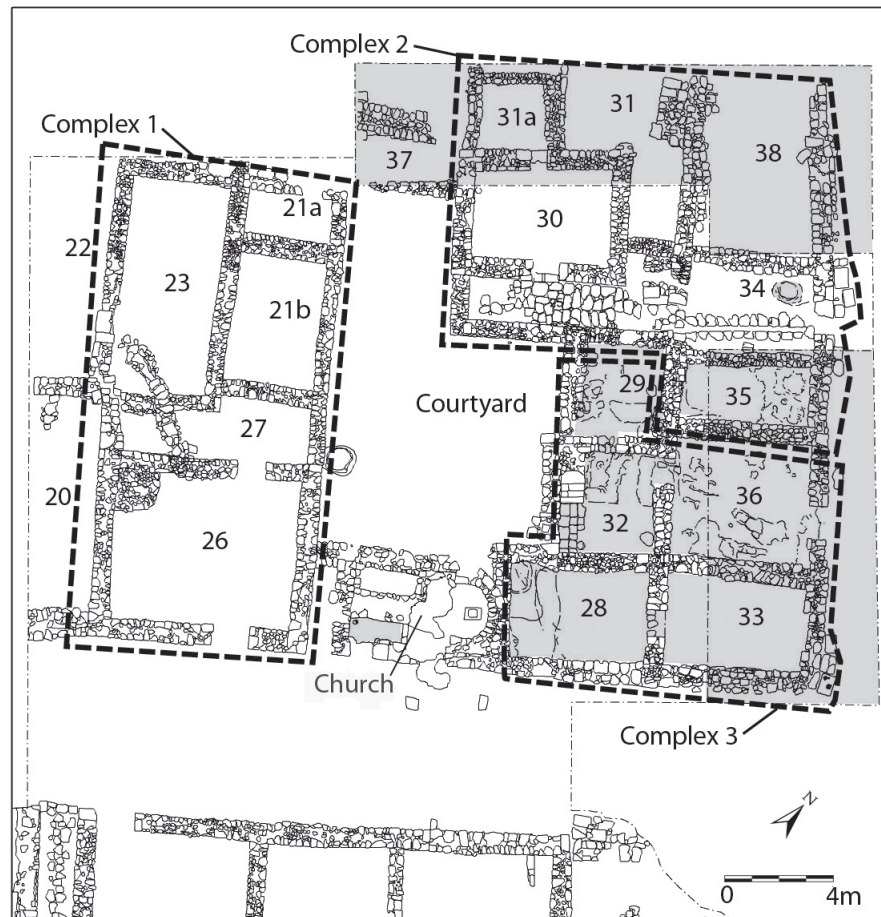


Figure 3. General plan of the excavation (2004 activity in grey).

answers to questions about the development of Chersonesos and about Late Byzantine daily life. The 2004 campaign itself has already clarified our understanding of the organization of space and activity in complexes 2 and 3, along the northeast side of the central courtyard, and the following discussion focuses on that topic (Fig. 3). Preliminary specialist reports on paleobotanical, and skeletal material are also included in this Annual Report, and the reader is invited to consult them for specific details.

### **General observations on the block's development in the Middle and Late Byzantine periods**

The stratigraphic deposits below the floors of some of the rooms in complex 3, as well as the fill of various cisterns and pits throughout the block, indicate significant activity in this area in the 9<sup>th</sup> and 10<sup>th</sup> centuries AD. Unfortunately, the cisterns and pits themselves are difficult to date, and much of the datable material may have been redeposited. Presently, none of it can be directly associated with specific structures. Thus, while some ambiguous features of the bedrock may preserve traces of buildings of this period, we have little concrete evidence for the 9<sup>th</sup>–10<sup>th</sup> century building phase in this block. The floors generally contain material of the 12<sup>th</sup> or even 13<sup>th</sup> centuries, and while it is possible that the chapel and parts of complex 1 are earlier, we lack conclusive evidence for construction before the 12<sup>th</sup> century. This impression is reinforced by the inclusion of ceramics tentatively dated to the 12<sup>th</sup> century in the mud mortar of various walls.

The construction techniques employed for the buildings in this area vary, although most walls are built in irregular dry-stone masonry in rough courses, faced on both sides with chinking, mud mortar, and pointing in finer mud plaster. The most striking feature involves the presence of horizontal slots a meter or so above floor level in many of the rooms; as determined in 2001, these slots served to house wooden sleeper beams, perhaps as a protection against seismic disturbances.\* It was originally thought that the

presence of this beam-slot was a chronological marker for the earliest building phase, but the relationships between walls in complexes 2 and 3 suggest that much of the construction in this area took place at the same time. A slight difference in the alignment of bonded segments of the northeast wall of the insula between rooms 35 (complex 2) and 36 (complex 3) further supports an argument for simultaneous construction by different groups of masons.

### **Complex 2**

Parts of complex 2 (room 30, the entrance corridor /internal court 34) were excavated in 2002, and were tentatively identified as a fish-processing area on the basis of finds, including a cooking stand and a large quantity of fish bones. The 2004 excavations complicated this interpretation to a certain extent: although additional evidence tends to confirm that identification for room 30 and a small rear room that opens off it (31a), we found that a separate room (35) with no evidence of cooking or fish also opened off this corridor. Furthermore, the stairs excavated in 2002 now seem to lead to the second story of a large room (38, not excavated) to the northwest of corridor 34, as does a corresponding staircase rising in the opposite direction from a small open courtyard (31) behind room 30. The blocking of the connection between 34 and 31 is a later addition, as is Room 31a. The rear door of room 30, however, is original. This suggests that in its first phase, the complex consisted of rooms around an open court, with access through the narrow corridor 34, from which also opened a



**Figure 4. Bronze encolpion during preliminary cleaning and conservation.**

\*Crimea is seismically active: a powerful earthquake caused widespread damage to buildings on the south coast around Yalta as recently as 1927.



detached storage room (35). Later, the corridor area was sealed off from the court, leaving rooms 30 and 31a to function independently. Access to the storage room, however, was maintained by the construction of a stairway leading over the dividing wall and presumably to a wooden landing outside the second floor of room 38. At that point, it still seems reasonable to suppose that rooms 30 and 31a, together with the paved corridor—probably unroofed—functioned as an area for fish processing and, perhaps, the sale of prepared fish. Room 38, its second story, and the associated courtyard, however, probably continued to serve a residential purpose.

The narrow, isolated room 35 had been largely cut down into bedrock, and with the exception of a raised platform with circular cuts meant to house pithoi, its floor was below the level of the corridor. Like other rooms along the northeast side of the block, it had been subject to an intense fire, and the remains of pithoi and organic material found in it attest to its function as a storage area. One

of the finds from this room, however, was both unexpected and important: a bronze *encolpion*, or reliquary cross, was found in the layer of burnt debris (Fig. 4 and Color Plate II-D). It may have been kept in a wooden chest, since around it were found a number of iron fastenings, and concretions on the surface preserve signs of a cloth in which it was wrapped. It is not clear whether room 35 was associated with the fish-processing area or with the residential rooms in the last phase, but the staircase leading from the corridor to the residential area suggests the latter.

### Complex 3

This complex was composed of five rooms at the east corner of the block (Fig. 5). In its earliest phase, these five rooms probably belonged to a single house organized, like its neighbors, around a small internal courtyard (32). The courtyard connected the other rooms of the complex and may also have been involved with the metalworking that took place in the shared central court of the block. In the beaten-earth floor just below the



Figure 5. Complex 3: the lower (stone) flight of the stairs that led to the upper story is visible in the internal courtyard. Note bench along street in lower left corner.

surface of the final phase, we found significant quantities of hammerscale, tiny flakes of iron produced by smithing activity.

The largest room in this complex (36) had an upper story, reached by a staircase in stone and wood rising from the court; the lower story was cut down into bedrock and its floor was substantially lower than those of the surrounding rooms. Unfortunately, its fill had been disturbed, and we have few clues about the way it was used. Another of the rooms (28) seems originally to have been an extension of the court, and its stone-paved floor and a bedrock-cut basin may indicate its use as workspace or manger. Like the internal courtyard, it was probably open to the sky, although the bedrock basin is fragile and would not have survived long-term use without some partial covering. Of the remaining two rooms, one (29) seems to have been used consistently for storage and perhaps food preparation. The other (33) communicated both with the street and with room 28, but its function in the first phase of occupation is unclear.

By the time this complex was destroyed, a number of changes had been made. Rooms 28 and 32 were divided by a rough wall and the door between room 33 and the street was blocked, leaving rooms 28 and 33 as a separate unit. Room 28 had at least a partial roof during this period, as large fragments of burnt beams and boards found on its floor indicate. Other structural features of room 28 hint at concerns for security during this phase. In addition to the blocking of the door between room 33 and the street and the separation of room 28 from room 32, the doorway between 28 and 33 was narrowed, and cuttings in the jambs are probably related to locking arrangements for the wooden door itself. Near the bedrock basin, we also found that a hiding-place had been cut back into the wall. Although it stood open when found, it is likely originally covered by the stones of that wall, and opened when the owner came back after the destruction to retrieve the valuables left there.

The presence of a “wall-safe” and the narrowing of the door may indicate that this room took on non-residential functions at this time. Such a conclusion is further supported by the presence

of a small built hearth or furnace in the floor of room 28. To judge from the quantities of slag found amid the ashes and charcoal that filled the hearth, it was used for small-scale smithing work. Even better evidence for industrial or commercial use was provided by room 33, which proved to be one of the most interesting areas excavated this season. In it, smashed by the collapse of roof and walls, were six large storage pithoi and eight amphorae, all in situ (Plate I-E). Among the pieces of these pots were the carbonized remains of their contents, providing rare material evidence for diet at Late Byzantine Chersonesos. Preliminary investigations indicate large quantities of grain, especially bread-wheat, as well as what seems to be fish-sauce and perhaps even larger dried fish (Fig. 6). A few grape pips from one of the amphorae may indicate that it held wine, rounding out the alimentary picture. Beneath these broken storage vessels we found fragments of various iron tools, some badly burned glazed ceramics, and, most surprisingly, intact pieces of wood belonging to furniture or storage vessels, including the base of a bucket or cask (Plate I-C). Although it is possible that these vessels and their contents were part of the foodstores of a large and wealthy household, the quantity and variety of the material and the physical separation of rooms 28 and 33 from the rest of the house strongly suggest that in the last phase of this complex these two rooms were put to use as a general store.

Room 28 also provided the latest evidence for activity in complex 3. Apart from the emptying of the hiding-place in the wall, a small pit had been cut into the layers of destruction near the wall abutting the apse of the chapel. Into this pit was laid the body of a newborn infant. Perhaps those who buried this baby chose the spot because of its proximity to the chapel, although it is likely that at this time the chapel itself was in ruins.

### The chapel

The excavations of the tombs associated with this neighborhood chapel which began in 2002 continued this season. We excavated two shallow juvenile burials in the floor of the building and a much larger number of articulated adult and child burials in the second of the two rock-cut tombs under this floor. These burials, described elsewhere in this annual report, numbered at least



32 in all, although only ten were articulated. As in 2002, few items were found in the grave, with the most common being bronze pendant buttons. The demographic profile and the individual pathologies visible in this sample will provide us with important additional information about daily life in Chersonesos. It is possible that future scientific analyses will even allow us to compare what the bones tell us about diet to the range of foods we found in rooms 30 and 33.

### The street

During the season, we cleared part of the alley or street running along the northeast side of the block and intersecting with the main *plateia* dividing this block from the cistern. The street itself was standard for the site, with a cobble of small pebbles bounded along the façade of the block by a packed-earth sidewalk. The surface of the street was lower in the center than at the sides, and down the edge of the excavated area ran a stone box-drain, the cover stones of which were visible in the surface of the street. The drain turned to the east where the street intersected the *plateia*, following the naturally sloping contours of the landscape.

In 2002, a small section of the street near the entrance to rooms 34 and 30 was uncovered, and the excavators found two Early Byzantine column capitals that had been reused to make a bench along the wall of the block. As more of the street was excavated this year, we found that this was not an unusual situation: there were two more examples outside other doorways in the façade. The most interesting of these was located near the

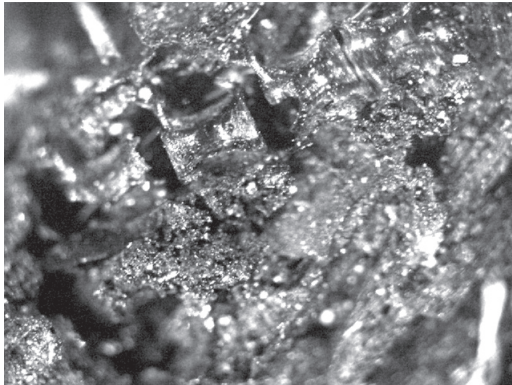


Figure 6. Microscope view of tiny fish-bones from a charred organic mass that may represent Byzantine fish sauce (*garos*).

intersection between the street and the *plateia*. It was composed of three marble architectural fragments from an earlier church, including two capitals with sculpted decoration. This bench was evidence for more than just earlier architecture, however, for on its surface were scratched two square game boards (Fig. 7). These game boards were of a type common in other parts of the Byzantine empire, and were almost certainly used to play a game called variously in English “Nine Men’s Morris,” “Merrills,” or “Mills.” This game became popular throughout Europe a hundred years later, but its appearance in 13<sup>th</sup> century Chersonesos reminds us just how closely connected to the Byzantine world this city was.

The street provided another surprise. It was covered with a layer of stones and broken tiles fallen from the structures along it, and directly under this layer, with no evidence of an intrusion, the skeleton of an elderly woman lay on the cobbles. Only part of the skeleton was excavated, but at this point we can suggest that our find confirms the long-held theory that the city was destroyed in the course of a violent sack in the second half of the 13<sup>th</sup> century.

### The earlier city

Apart from the cistern and some associated rooms, this area had previously produced very little evidence for activity in the Greek and Roman periods. Traces of the earlier history of this block appeared in 2004, however, at the bottom of a Byzantine pit dug in a room just to the northwest of the main courtyard. The pit descended to a surface of massive worked stone slabs, where it stopped, perhaps because it was too difficult for the excavators to continue (Plate I-B). We do not yet know the purpose of these slabs, although a monumental pavement like that found in the northern agora is perhaps the most likely interpretation. Whatever these slabs represent, however, it is clear that this region was home to more extensive construction in the Greek and/or Roman periods than had previously been thought.

## Conclusions

This season was a particularly productive one for the development of a contextual view of life in Late Byzantine Chersonesos. Although many features of the structures we excavated have parallels elsewhere in the Byzantine world—two-story houses, the lack of separation between industrial and residential areas, the presence of commercial establishments in close association with domestic space—our access to the original contents of those spaces is unique. We are currently undertaking a broad program of scientific analysis of the various types of material remains, some preliminary results of which will be presented elsewhere in this report. Together with further excavations in 2005, our research will help to paint a comprehensive picture

of life in a provincial Byzantine town in the 13<sup>th</sup> century AD, from the food on hand in the local grocer's stockroom to techniques of small-scale ironsmithing to the ailments of the citizenry. As this picture comes together, we also hope to tie in other lines of investigation to understand larger economic and social issues. It would be useful to know, for example, whether the shop was selling local or imported food, and to reconstruct the vegetation of the landscape to determine whether the hinterland was being cultivated or used for pasturage. When this research is complete, the digital documentation system we continue to develop will help to present fully contextual results of excavations at Chersonesos to Western audiences for the first time.

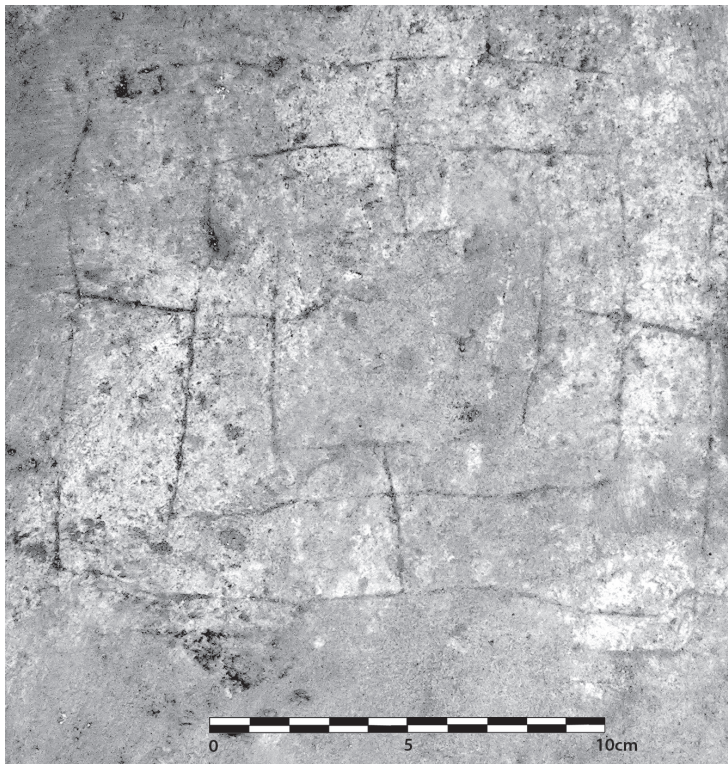


Figure 7. Bench with incised gameboard; at right, a game piece found nearby (L: 3.3cm).



PLATE I



A. Overall view of block, facing southwest. At top, Complex 1; at bottom, Complex 3.



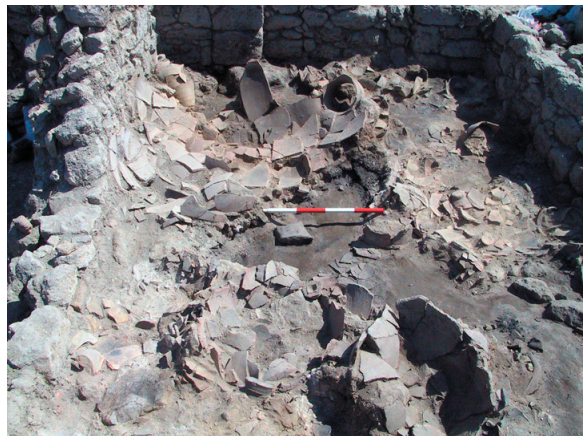
B. Monumental stone slabs of the Roman (?) period exposed at the bottom of a Late Byzantine pit in room 37.



C. Conservators consolidate the remains of a wooden bucket or casket.



D. NPTC conservators Olga Demianova and Yulia Ryzhova consolidate and lift fragile archaeological material in the field.



E. The remains of storage vessels (pithoi and amphorae) found crushed *in situ*, room 33.



PLATE II



A. Sgraffito-ware jug found on the floor of room 28; 13<sup>th</sup> century (1:2).



B. Small green-glaze jug found on the floor of room 29; late 13<sup>th</sup> century (1:2).



C. Detail of sgraffito-ware jug depicting a Harpy; late 13<sup>th</sup> century.



D. Front and back pieces of bronze encolpion, after cleaning and conservation (1:2).



E. Bone cylinder (handle?) with incised decoration and perforations (1:1).



F. One of many coins with rho-omega monograms found in 13<sup>th</sup> century levels. Dating of these coins, which seem to have been minted at Chersonesos, is controversial (1:1).



G. Elaborate copper-alloy suspension hook, perhaps part of a hanging metal lamp or candelabrum (1:1).

**PRELIMINARY REPORT OF ANTHROPOLOGICAL RESEARCH  
BURIALS FROM THE CHAPEL**

Renata J. Henneberg

*Dept. of Anatomical Sciences, Medical School, U. of Adelaide*

Denis Ponomarev

*National Preserve of Tauric Chersonesos*

Anthropological field research on the human remains from the excavation started with the arrival of Renata Henneberg and Denis Ponomarev in the first week of July and continuing for the month.

### **Description of the work**

From the first day of their arrivals the authors were involved in the excavation of the newly opened Tomb 2 (context 362) in the area of the chapel. After three days of excavating, Henneberg left the field to collect additional data on skeletal material from Tomb 1, excavated in 2002 (see *Annual Report 2002*, pp 31–33), while Ponomarev continued unearthing the skeletons from Tomb 2. The work on Tomb 2 was completed after a week of excavation. With the help of a student, Ponomarev began cleaning the material, washing and drying the bones, and assembling the entire material to establish the number of individuals in the tomb. Henneberg began collecting data on the newly-excavated individual skeletons and continued working on the skeletal material from the previous season.

Like Tomb 1, Tomb 2 was a multiple secondary burial where skeletons of adults and children of various ages were mixed together. Most of the adult individuals were placed in the tomb on top of each other, with their heads against the northern wall of the tomb. Children were buried in various directions between the adults.

In the process of unearthing the layers of the burial, it was possible to distinguish and recover most of the bones of ten individuals. The bones of the other individuals were badly mixed and so had to be treated as disarticulated for further analysis.

### **Preliminary results**

The counting of long bones, clavicles, and other parts of the skeleton—by each author independently—resulted in establishing a minimum number of 32 skeletons in Tomb 2. There were 8 adult and 14 child skeletons among the disarticulated bones and almost complete skeletons of 5 adults and 5 children, giving the total number of 13 adult and

19 children buried in the tomb. The age of adults in the Tomb 2 varied from 20–22 years to 40–50 years, and children's ages from newly born to 8–9 years. The majority of children were young, dying within the first year of life (a total of 8 and one fetus 7–8 months). There was one 8–9 year old and two 5–6 year-olds. The age of the second large group of children was between 1–4 years at the time of death. This makes the average age of the group of individuals in Tomb 2 younger than the average age of individuals buried in the Tomb 1.

### **Diseases and injuries**

The detailed palaeopathological analysis of the skeletal material from Tomb 2 and the description of the new material, according to the requirements of the Ukrainian Academy of Science was carried out contemporaneously, with detailed physical anthropological analysis of the material which



**Figure 1. Skull of Individual No. 6, Tomb 2, showing injury to the left maxillary and zygomatic bones. Male, 35–40 years old. (Photo: A. Los)**

included: skull, bone and teeth measurements; collection of data on epigenetic traits on skulls; postcranial skeletons and teeth; observations of dental diseases; and observations of pathological signs on bones. While working on the different aspects of the analysis the authors consulted each other about new findings and analysis of the material. (There is no better way of studying the skeletal material than if two specialists with slightly different experience can work together on the same material and complement each other's observations, which also adds to the reliability of the observations.)

The most important of injuries and diseases from this season included:

- The injury to the left maxillary and zygomatic bones of a male 35–40 years old (skeleton No. 6)
- The kidney stones found in the position of the urinary tract of the same male (skeleton No. 6)
- The spina bifida occulta of the sacrum (the posterior arches of the first sacral vertebra remain open as opposed to the normally fused arches) in two of the adult individuals (skeleton No. 5 and No. 8)
- The deformed femur of the child with rickets (rachitis), a single, isolated bone
- Several individuals, including an adult, affected with peculiar, plaque-like periosteal reaction on long bones, suggesting pulmonary disorders (possibly pneumonia).

Individual No 6 received a blow to the left cheek which crushed his left maxillary and zygomatic bones in its central parts (Fig. 1). The impact also deformed the lateral and medial wall of the eye socket and the left wall of the nasal cavity. Most probably the nerves controlling the muscles of the left side of the face were also injured leaving that side paralysed. The injured person recovered, with the bone partially repairing itself, covering the cheek with thin layers of bone tissue with openings in them. Because the person could not masticate on the left side, he accumulated large tartar deposits on all three molars. At the time of recovery, carious lesions developed rapidly on the first and the second upper molar teeth due to the restricted saliva flow caused by the paralysis of this side of the face. The inflammation reached the tips of the tooth roots, causing the development of periapical abscesses.

The thin layer of bone separating maxillary sinuses was destroyed, allowing the inflammation to spread to the rest of the head. This spreading of inflammation was most probably the cause of the death, an interpretation of the events based on the healing processes of the wound.

Interestingly, the same person developed kidney stone which was recovered from the pelvic cavity. (Further analysis of the stones and the description of the finding will be undertaken by Ponomarev.)

From the two people with the open first sacral vertebrae (the skeleton of a female 25–35 years old, No. 5, and the skeleton of a male 20–30 years old, No. 8) the pathologies of the male are the more interesting. This individual probably suffered from the severe back pain caused by degenerated intervertebral discs in the lower thoracic region of the spine. Deep wounds to both sides of the vertebral bodies developed (Schmorl's nodes) causing pain and limited movement. The lower extremities exhibited little remodelling (almost no linea aspera on either femora which are usually moulded into a high edge by powerful leg muscles), suggesting limited use, even though the bones looked generally healthy and heavy. This same individual also had degenerated disks of the very upper part of the thoracic spine. The upper extremities seem to have been normally used. There was considerable asymmetry (10 mm difference) between arm (humeri) length, suggesting a more strenuous use of the right, longer arm from early age according to Henneberg. Ponomarev suggested that the degeneration of the upper thoracic discs could be related to poliomyelitis, which resulted in his at least partial paralysis. These pathological findings require further investigation.

The isolated tibia of a 5–6 year old child represents a clear and convincing case of rickets (Fig. 2).

The thin layer of periosteal deposit on long bones—associated with pulmonary diseases—of several children and an adult suggests that the problem was common in Chersonesos. Analysis of the entire material again next season may confirm the disease's frequency in the area.

The entirety of the teeth from tombs 1 and 2 (2002 excavation) were collected in time to finish the analysis of the entire dental material from these features. The material was analyzed by dentist Vladimir Smirnov, who described most



of the dental diseases, including caries, abscesses, crowding, and root absorption due to injury. Some of the findings were illustrated with x-rays of the affected tooth or the bone area.

What remained to be done by Henneberg was a description of the 34 discontinuous traits of teeth, a description of dental wear and dental hypoplasia, and a measurement of teeth necessary for statistical analysis. The material from Tomb 2 amounted to 340 teeth (218 permanent and 112 deciduous teeth; from Tomb 1 the number of teeth studied was 563 (504 permanent and 59 deciduous teeth). The total number of teeth studied from both tombs was just over 900. Twice as many sockets were also studied.

#### **Evidence for syphilis in Europe before 1492 AD**

The description and the analysis of the teeth of the 6–7 year old child, with a specific type of hypoplasia on the molars, were of particular importance. All four permanent molars have occlusal surface changes (mulberry molars) suggesting to Henneberg that the child was affected

by congenital syphilis. (Congenital syphilis could not have been previously proposed in connection with the dental changes as the collection of teeth had not been returned to Chersonesos, making the comparison of the adult skull with changes and the child with the teeth impossible).

These two findings are the strongest evidence to date (the most convincing being characteristic changes of the nose and palate) for the presence of this disease in Europe before the return Columbus' crew from America (for comparison see the statistical analysis of syphilitic signs from rural Metaponto, Henneberg et al. 1992, Henneberg and Henneberg 1994, Carter 1998). The detailed description of the cases from Chersonesos, with appropriate illustrations, will follow in a separate, coauthored publication.

Other preliminary observations on the 94 individuals from both tombs (62 from the Tomb 1 and estimated 32 from the Tomb 2) include a greater number of dying children compared to other parts of Europe for that period (13<sup>th</sup> century AD). This requires a further and detailed palaeodemographical analysis (Henneberg). The skeletal samples from Tomb 1 and Tomb 2 display different discontinuous morphological traits (metopism present in Tomb 1 in two cases but none is found in Tomb 2, for example). The full analysis of the data collected on the set of 66 epigenetic traits may reveal further similarities and differences between the individuals from two tombs (Henneberg).

Several pathological specimens were taken to the Radiological Department of the 3<sup>rd</sup> City Hospital. The radiological analysis of the skeletal material is a standard procedure, especially useful in case of pathological findings.

With the help of radiologist Dr. Victor Krotov and technical assistant Alla Kril, several long bones, two skulls, and a few smaller bones were x-rayed for a total of ten exposures. These x-rays will allow better documentation of the most important pathological cases from the two seasons of excavation: syphilitic skull, tibia with periosteal reaction, several fractures including the cheek injury to the male from Tomb 2, rachitic femur of a child, and pulmonary arthropaties. The x-rays were scanned and files stored on disks for description and further study.



**Figure 2.** Tibia of a child, 5–6 years of age, showing deformation from rickets.  
(Photo: A. Los)

In the last two days Henneberg photographed and supervised the photography of the anthropological findings, including pathological specimens from two seasons of work (Tombs 1 and 2), and selected morphological traits for illustration of various parts of the anthropological analysis of the entire skeletal material. Copies of the two disks with photographs are in the possession of both investigators, allowing them to work independently on the description of the material and preparation of the final report.

Anthropological research on the skeletal and dental material from Chersonesos in 2004 was extremely productive. While the research was delayed by the separate storage of dental material

and bones, it is hoped that next season the common storage of all the skeletal material in a convenient location will add efficiency. Two or more tombs are expected to be opened next season, and it is essential that the new discoveries be studied along with previous materials.

We wish to thank the Ukrainian authorities, the National Preserve of Tauric Chersonesos, the Institute of Classical Archaeology and its sponsor, the Packard Humanities Institute, for allowing us to study the human skeletal material from Chersonesos. We thank all who helped us on the site and during the analysis to complete this successful study.

Paleoethnobotanical investigations under the joint auspices of ICA and NPTC were initiated at Chersonesos in 2002. Fossil carbonized remains of plants were collected in the course of excavations in the ancient city and its adjacent chora on the Heracleian Peninsula. Samples were taken from on-going excavations in the southern quarter of the city (see this Annual Report and those of 2001 and 2002) and from Farmsite 132 (Annual Report 2001) and Bezymyannaya (Annual Report 2002 and previous annual reports). Ongoing analysis aims at determining the variety of both plants cultivated by the Chersonesos residents and edible useful wild-growing plants. A further goal is to ascertain the temporal changes in plant species encountered and their relation to those of Chersonesos' Greek and non-Greek neighbors. This is a preliminary report on the first two research campaigns, in 2002 and 2004.

Ancient agriculture on the north coast of the Black Sea has been examined in many published works over the last 50 years listing the cultivars used by the inhabitants of the Greek poleis and their environs. Serious Paleoethnobotanical investigations of this area, however, are still surprisingly scanty. In the 1970s, exceptionally, Z.V. Janushevich initiated a detailed search on the plant remains in the Chersonesan chora. Up to that point the modern literature relied almost entirely on the chance remarks on crops by ancient authors, and occasionally on accidental archaeological finds. Sometimes the plant remains discovered by an archaeologist were passed over to botanists or plant-breeders for identification, but this was a fairly rare occurrence. In some cases the archaeologists themselves identified the cereals and seeds they had found and their unverified results were published, thereby compounding their errors as the work was uncritically cited by others. Thus, a false idea of the plants cultivated in the past was created and unfortunately is still in circulation.

In the previous paleobotanical work at Chersonesos by Janushevich along with G.M. Nikolaenko, carbonized grains (*caryopsides*) and seeds were collected in the course of excavation at four farmsteads in the chora (Nos. 25, 91, 150, 203 according to the numbering system of Strzheletsky) all dated from the 4<sup>th</sup> to the 2<sup>nd</sup> centuries BC. This collection was found among various archaeological materials on the floors of the buildings, sometimes at the bottoms of pithoi and amphorae. No special water flotation was carried out, and only grains and seeds visible by the naked eye were picked up (Janushevich, Nikolaenko 1979; Nikolaenko, Janushevich 1981; Janushevich 1986: 40-70; Janushevich 1989).

### Samples and Sample Processing

The process of separating plant remains from the archaeological soil matrix, flotation, was carried out on soil samples collected during excavations in 2001 and 2002 in 2002 for the first time, and again in 2004. The samples came from all over the sites and from stratified levels within the structures, wells, hearths, silo and refuse pits. The volume of soil in each case was approximately 10 liters. Flotation made use of water supplied from a mobile water tank, a reused oil barrel with a spout, and a set of four sieves with meshes of various sizes from 0.25 to 1 mm. The sieving produced specimens whose size was in direct relation to the diameter of the sieve meshes. The samples not only contained organic material including carbonized grains and seeds, small pieces of coal, fragmented shells, bones and scales of fish, but also ceramic and glass fragments, and slag. Further, very time consuming analysis of the samples from Chersonesos by means of a microscope took place over the winter months in the laboratory of the Archaeological Institute of the National Academy of Sciences in Kyiv. Plant remains, mostly represented by carbonized grains and seeds, more seldom by chaff (*rachis* segments of ears and "spikelet forks") were identified and measured.



Palaeoethnobotanical spectra (PBS) were determined on the basis of research results for probes from each of three test areas. The term PBS is applied here as a general one, characterizing the variety of plants cultivated by the Chersonesites within the city's boundary for their household needs. Its usage instead of "cultivated plants", "agricultural crops", etc. is more appropriate in this case. These terms fit more for the description of finds from countryside settlements where farming was a major occupation of the inhabitants.

These categories—palaeoethnobotanical complex (PBC) and palaeoethnobotanical spectrum (PBS)—were introduced into the palaeoethnobotanical research practice in order to find out the indirect role of this or that agricultural crop while preparing characteristic description of the archaeological settlements (PBS) and archaeological cultures (PBC) (Kravchenko, Pashkevich, 1985). For the totality of grains and seeds (imprints or carbonized material) of an identified crop a concept of palaeoethnobotanical complex PBC was suggested. Multiple sites are factored into the establishment of a PBC. A variety of plants revealed for an individual settlement (chronological phase) characterizes

its palaeoethnobotanical spectrum (PBS). Thus, PBSs for different settlements of the same culture together present PBC of the given archaeological culture. The quantitative composition of plants grown within PBC and PBS is revealed by means of percentage ratio. There is no doubt that percentage determined by way of counting the discovered material reveals the real share of each agricultural crop only with a certain degree of probability. However, for the present this is the only way to compare the role of specific plants in each archaeological culture and settlement.

When the size of samples, the amount of soil analyzed is known, the quantitative composition of plants grown in a PBC or PBS is revealed by means of a percentage ratio. The percentage determined by counting the recovered plant material reveals the share of each agricultural crop, but only with a degree of probability. Not all crops, obviously, produce the same number of seeds, and the preservation of seed material even from the same archaeological context cannot automatically be assumed to have been uniform. For the present, however, PBC and PBS are the only ways to compare the role of this or that plant at each site and within an archaeological culture.

Common Name	Latin Name	Quantity
<b>CEREALS</b>		
bread wheat	<i>Triticum aestivum s.l.</i>	10
emmer wheat	<i>Triticum dicoccum</i> (spikelet fork)	1
barley	<i>Hordeum vulgare</i>	9
<b>PULSES</b>		
lentil	<i>Lens culinaris</i>	1
pea	<i>Pisum sativum</i>	3
bitter vetch	<i>Vicia ervilia</i>	3
	<i>Legume fragments</i>	0
<b>FRUIT</b>		
wine grape	<i>Vitis vinifera</i>	7
fig	<i>Ficus carica</i>	3
<b>WEEDS</b>		
lambsquarters	<i>Chenopodium album</i>	66
fumitory	<i>Fumaria</i>	17
cleaver	<i>Galium aparine</i>	3
silene	<i>Silene sp.</i>	3

Figure 1. Farm 132, 2002 excavation.

## The Chora in the Greek and Roman Periods

*Farmhouse 132 (3<sup>rd</sup>–2<sup>nd</sup> centuries BC)  
in the Yukharina Balka drainage*

Seven samples were taken from the undisturbed lowest levels of a cistern in the courtyard (see *Annual Report* 2001, pp. 55–60) and processed by flotation. A limited number of carbonized grains and seeds of the following plants was discovered. The cereals consisted of emmer wheat, *Triticum dicoccon*, bread wheat, *Triticum aestivum* s.l., hulled barley, *Hordeum vulgare*; the legumes of lentil, *Lens culinaris*, common vetch, *Pisum sativum* (complete seeds and seed fragments), bitter vetch, *Vicia ervilia*; the fruits of grape pips, *Vitis vinifera*, and fig seeds, *Ficus carica*. In addition a single spikelet fork of *Triticum dicoccon* was preserved. Among the weed seeds, those of goosefoot, *Chenopodium album*, were most numerous, but fumitory, *Fumaria*

*sp.*, lady's bedstraw, *Galium aparine*, and silene were also present. These results are summarized in Fig. 1.

Bread wheat and barley, the most frequent finds, are represented by ten and nine grains, respectively. Such a small number could most probably be explained in the following way: the main destination of this cistern, in the period the farm was inhabited, was for storing water and, thus, the opportunity for carbonized grains to end up there would have been slight.

### Bezmyannaya

Seven samples were taken from deposits dating from the 1<sup>st</sup> to 3<sup>rd</sup> centuries AD from Room 1 (see *Annual Report* 2002, p. 16). Flotation yielded evidence of the following cereals, legumes, fruits

Common Name	Latin Name	Quantity-2002	Quantity-2004
<b>CEREALS</b>			
eincorn wheat	<i>Triticum monococcum</i>	0	17
bread wheat	<i>Triticum aestivum</i> s.l.	31	1261
emmer wheat	<i>Triticum dicoccon</i>	4	44
emmer wheat spikelet	<i>Triticum dicoccon spikelet</i>	1	1
spelt	<i>Triticum spelta</i>	0	3
barley	<i>Hordeum vulgare</i>	38	86
naked barley	<i>Hordeum vulgare</i> var. <i>coeleste</i>	1	4
rye	<i>Secale cereale</i>	4	17
broomcorn millet	<i>Panicum miliaceum</i>	13	2
<b>PULSES</b>			
lentil	<i>Lens culinaris</i>	9	3
pea	<i>Pisum sativum</i>	5	16
faba bean	<i>Vicia faba</i> var. <i>minor</i>	0	3
bitter vetch	<i>Vicia ervilia</i>	20	30
<b>FRUIT</b>			
wine grape	<i>Vitis vinifera</i>	25	39
fig	<i>Ficus carica</i>	6	0
<b>WEEDS</b>			
field brome grass	<i>Bromus arvensis</i>	0	3
lambsquartens	<i>Chenopodium album</i>	5	0
common fumitory	<i>Fumaria officinalis</i>	3	0
cleavers grass	<i>Galium aparine</i>	1	5
yellow foxtail grass	<i>Setaria glauca</i>	2	0

Figure 2. Bezmyannaya, 2002 and 2004 excavations.

and weeds: emmer wheat, *Triticum dicoccon*, and bread wheat, *Triticum aestivum* s.l., hulled barley, *Hordeum vulgare*, and naked barley, *Hordeum vulgare* var. *coeleste*, common millet, *Panicum miliaceum*, rye, *Secale cereale*, oats, *Avena sativa*, lentil, *Lens culinaris*, field pea, *Pisum sativum* (complete seeds and their fragments), bitter vetch, *Vicia ervilia* (complete seeds and fragments). Complete and fragmented pips of grape, *Vitis vinifera*, and fig seeds, *Ficus carica*, were also discovered. There are not many weed seeds. There are seeds of white goosefoot, *Chenopodium album*, fumitory, *Fumaria* sp., lady's bedstraw, *Galium aparine*, yellow foxtail, *Setaria glauca*, and rye chaff, *Bromus secalinus*. A "spikelet fork" of emmer wheat, *Triticum dicoccon* was present. Grains of bread wheat, *Triticum aestivum* s.l., hulled barley, *Hordeum vulgare*, and

millet, *Panicum miliaceum*, are the most numerous among the finds. Small agglutinations of millet grains fused in carbonization were found on the beaten earth floor of Room 1.

Regularly the grains of this cereal are baked into a solid mass when carbonized and it is impossible to separate grains due to their fragility. This same sample contained a considerable number of small fragments of grains, most probably those of wheat and barley, and also some small pieces of coal, broken fish bones, and scales.

It is evident that the overwhelming majority of grains from the site belong to the following three cereals: *Triticum aestivum* s.l., *Hordeum vulgare*, and *Panicum miliaceum*. The other cereals are represented by individual grains: *Triticum dicoccon*,

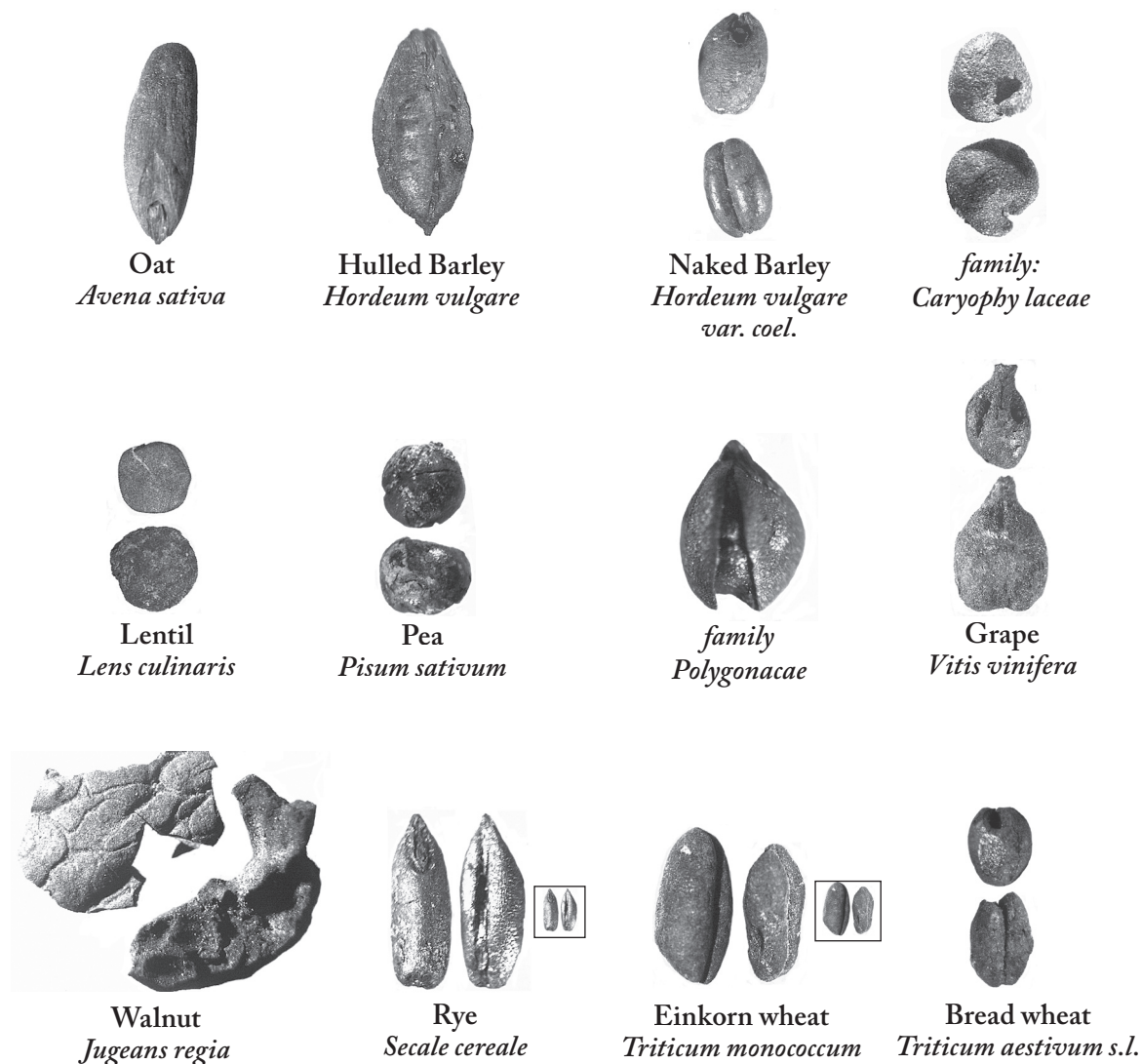


Figure 3. Seeds from Chersonesos, enlarged to show detail (except actual size images adjoining Rye and Einkorn wheat).

*Hordeum vulgare* var. *coeleste*, *Secale cereale*, *Avena sativa*.

*Vicia ervilia* seeds predominate among the legumes, which also included *Lens culinaris* and *Pisum sativum*. See Fig. 2 for a summary.

I am grateful to the excavators of this site and Site 132, Drs. G.M. Nikolenko, Tatiana Yeshiva, Adam Rabinowitz, and J.C. Carter, Director of ICA, for allowing me to participate in this important research in the chora.

#### Bezmyannaya 2004

Three samples were taken from the hilltop site during the excavation conducted by G.M. Nikolaenko of the National Preserve and Prof. P. Freeman for ICA. The results of this investigation are summarized and incorporated in Fig. 2.

#### City of Chersonesos, Late Medieval Period (10<sup>th</sup> to 13<sup>th</sup> Centuries AD)

A block of the residential south eastern quarter of the city has been the object of on going joint-excavations by ICA and the National Preserve since 2001. The site is located along the main

north south street of the ancient city, across from the major cistern and water supply for Chersonesos from late Roman times until the 10<sup>th</sup> century AD (see *Annual Reports* 2001 and 2002).

The samples for flotation were taken in 2001 from Room 20 and Rooms 23, 25, 26, 30 in 2002. All contexts date to the mid-13<sup>th</sup> century AD except for that taken from the fill of a pit in the courtyard, dated by associated ceramics to the 10<sup>th</sup> century AD. I am grateful to the excavators Dr. Larisa Sedikova and Prof. Paul Arthur (in 2002) and Dr. Adam Rabinowitz (in 2004) for their active collaboration.

Samples were taken from the hearth and ash layer of Room 20 from the filling of a pit in Room 23 (the organic remains consisted mainly of fish bones and scales indicating that the pit was used to store fish), from the floor of Room 25 (where fish remains were found, as well as slag, glass and ceramic fragments which attest the varied activities here), from the hearth in Room 26, from a pit in Room 30, rich in cereal, legumes and fruit, and from the ash layers and the fill of the gutter

Common Name	Latin name	Sample location, by room											
		20	23	25	26	30	34	CY	29	32	33	35	36
eincorn wheat	<i>Triticum monococcum</i>						8			11	155	126	96
emmer wheat	<i>Triticum dicoccon</i>			1			37	26	2	20	226	271	171
spelt	<i>Triticum spelta</i>						1				91	177	102
bread wheat	<i>Triticum aestivum</i> s.l.		2	4	6	13	92	162	97	220	3781	1752	726
barley	<i>Hordeum vulgare</i>		3		3	4	7	41	1	35	114	117	587
naked barley	<i>Hordeum vulgare</i> var. <i>coeleste</i>					6	18	34		2	36	78	3
rye	<i>Secale cereale</i>			2	3	3	10	38	30	64	497	647	116
oat	<i>Avena sativa</i>		2	1					1	14	26	8	46
broomcorn millet	<i>Panicum miliaceum</i>	4			2	13	3	3	5	20	30	10	32
cereal fragments		2	1	21	10	50	37	365	42	7	193	300	201

Figure 4. Cereals, Medieval Chersonesos, SE Quarter (CY = Courtyard).

in Room 34. As noted above, the sample from the pit fill in the courtyard is a record of three centuries earlier (apart from the plant remains, a large number of fish bones and scales, pieces of slag and coal testify to the continuity of activity in this area of the city in the Late Medieval period).

During the 2004 campaign some 77 soil samples averaging 10 liters each were taken from Rooms 29, 32, 33, 35, and 36.

The quantities of paleobotanical recovered varied much from one context to the next, even within the same room. For example from Room 33 about half the samples had carbonized wood, slag, but no grains while others had a very large number of cereals. There were clear signs of burning and it is likely that some of the grain in the room was completely destroyed by the fire. On the whole, the cereals greatly outnumbered the other plants, such as the legumes, fruits, and weeds. Remains not only of cereal grains but also of the remains of

chaff, the *rachis* intermodes and fragments, spikelet forks, *glauca* and *culms* make it clear that the cereal crop was stored on the premises. It appears that the hulled wheats (and barley) once cut were brought in from the fields and stored until they were needed, and then threshed on the spot.

Rye, *Secale cereale*, and oat, *Avena sativa*, probably played a minor role and were cultivated to supplement the diet of the wheats. Rye in a significant quantity is found only in Room 35. Common millet, *Panicum miliaceum*, is barely represented in Room 36 where grains found were caked together and burned.

Among the legumes were lentil, *Lens culinaris*, a field pea, *Pisum sativum*, and a broad bean, *Vicia faba*, which may well have been consumed by the human inhabitants, as well as the forage crops *Vicia ervilia* and *sativa*.

Remains of fruits: the fig, *Ficus carica*, wine grape, *Vitis vinifera*, and blue elderberry, *Sambucus*

Common Name	Latin Name	Sample location, by room											
		20	23	25	26	30	34	CY	29	32	33	35	36
lentil	<i>Lens culinaris</i>	1			1		2	6	1	8	7	15	7
pea	<i>Pisum sativum</i>			1	1	2	4			7	3	8	17
chickpea	<i>Cicer arietinum</i>					1	2						
fava bean	<i>Vicia faba var. minor</i>											1	
bitter vetch	<i>Vicia ervilia</i>	1					1	4		1			9
common vetch	<i>Vicia sativa</i>									1	1		2
vetch	<i>Vicia sp.</i>								1	2	2		
legume fragments		2			1		8	6					

Figure 5. Legumes, Medieval Chersonesos, SE Quarter (CY = Courtyard).

*nigra*, are present but not numerous. The olive, *Olea europea*, and date, *Phoenix dactylifera*, pits are evidence of some form of contact with the Mediterranean in the 13<sup>th</sup> century AD, probably through Genoese traders based nearby.

Many of the samples are characterized by a broad range of weed seed. These plants could belong to

the vegetation of the chora and in the city and its environs (the elderberry, for instance). All could be associated with the grain crops or could have grown at the edges of fields and roads or in the gardens. The complete evidence is summarized in Figures 4–7.

Common Name	Latin Name	Sample location, by room											
		20	23	25	26	30	34	CY	29	32	33	35	36
wine grape	<i>Vitis vinifera</i>				1	2	3			4			6
olive	<i>Olea europaea</i>	6		3	1			1	1				
fig	<i>Ficus carica</i>								1	107			4
plum (?)	<i>Prunus sp.</i>	2		1			1	4					
walnut, nutshell fragments	<i>Juglans regia</i>	3			5			17	14	10	13		21
hazelnut, nutshell fragments	<i>Corylus avellana</i>	2		1		1	3	1		4	4		2
mulberry	<i>Morus nigra</i>										1		
raspberry	<i>Rubus idaeus</i>	18											

Figure 6. Fruits & Nuts, Medieval Chersonesos, SE Quarter (CY = Courtyard).



Common Name	Latin name	Sample location, by room											
		20	23	25	26	30	34	CY	29	32	33	35	36
corn cockle	<i>Agrostemma githago</i>				1	1			4	5	72	10	13
brome grass	<i>Bromus arvensis</i>	2							1	16	19		4
barren brome grass	<i>Bromus sterilis</i>									3	6		
knapweed	<i>Centaurea sp.</i>									1			
lambsquarters	<i>Chenopodium album</i>	25	1		2			2					
bindweed	<i>Convolvulus arvensis</i>										2	1	6
barnyard grass	<i>Echinochloa crus-galli</i>										3		1
sun spurge	<i>Euphorbia helioscopia</i>			1			2	2	10			8	11
common fumitory	<i>Fumaria officinalis</i>	4			4			1	1	1			6
cleavers grass	<i>Galium aparine</i>							4	1	5	9	7	23
pearl plant	<i>Lithospermum arvense</i>						1	1					
darnel ryegrass	<i>Lolium temulentum</i>												1
chessflower	<i>Malva pusilla</i>										30		41
common mallow	<i>Malva silvestris</i>											5	80
bur clover	<i>Medicago sp.</i>	18											
grass family	<i>Poaceae indetermin.</i>	2											
doorweed	<i>Polygonum aviculare</i>				1								
black bindweed	<i>Polygonum convolvulus</i>	1			1								22
sheep sorrel	<i>Rumex acetosella</i>			1	4				2	1	33	14	21
curly dock	<i>Rumex crispus</i>									2	6	3	17
European elder	<i>Sambucus nigra</i>					2		15	24	81	11		9
daneworf	<i>Sambucus edulus</i>								19	35	2	7	74
yellow foxtail grass	<i>Setaria glauca</i>				1					110	4	2	50
green bristle grass	<i>Setaria viridis</i>									18	5		5
camplon	<i>Silene sp.</i>	1		1	1			1			1		
clover	<i>Trifolium sp.</i>												2
nettle	<i>Urtica sp.</i>										1		5
vetch	<i>Vicia sp.</i>								1				
field pansy	<i>Viola arvensis</i>												1

Figure 7. Spontaneous Plants and Weeds, Medieval Chersonesos, SE Quarter (CY = Courtyard).



Aleksey K. Kasparov  
*Institute of Material Culture, St. Petersburg*

The osseous remains of animals excavated during the campaigns of 1998 and 2000 help create a picture of the environmental and economic state of the sizeable rural settlement of Bezmyannaya. This settlement, at the southern extreme of the chora of Chersonesos, one of the highest points on the chora, approximately 240 meters above sea level, 8 kilometers south of the ancient city. It overlooks the best land approach to ancient Chersonesos (modern Sevastopol). It was active in the Hellenistic, Roman and medieval periods. Excavations have revealed a central, fortified hilltop with a number of terrace walls and other unidentified structures. It is likely that troops were stationed here in all periods of its occupation.

The osteological evidence collected during excavations from 1997 to 2004 have provided a rich array of information, yielding valuable insights into the animal life in the area. (See tables, Fig. 1 and 2)

While the precise dating of some contexts was impossible due to damage caused when the hilltop was occupied during the Crimean War and World War II, the stratigraphy remained intact over much of the site. The osteological material from Bezmyannaya can be divided into the following chronological groups: early Hellenistic period (3<sup>rd</sup> to 2<sup>nd</sup> centuries BC); late Hellenistic and Roman periods (end of the 2<sup>nd</sup> century BC to 3<sup>rd</sup> century AD); early medieval period (4<sup>th</sup> to 7<sup>th</sup> centuries AD); and medieval period (8<sup>th</sup> to 10<sup>th</sup> centuries AD). The quantity of bone fragments from Hellenistic and medieval contexts is small and therefore is not a reliable guide to activity during these periods (see *Annual Report* 2000, pp. 31–42, and 2002, pp. 8–17).

A comparison of the faunal evidence from the fortification area reveals a reduction in the relative percentage of cattle in the late Hellenistic to medieval periods (Fig. 2). This tendency does not conform to findings elsewhere in the northern Black Sea coastal region, where cattle use generally increased during these periods. Appreciable

differences also emerge between the fortress and the surrounding areas. The horse and cattle bones from inside the fortress are much smaller in number, while bones of pigs and sheep are much greater. [Horses and cattle, used principally for transportation, required nearby pasture lands; pigs and sheep were a ready source of protein required to feed military forces. *ed.*]. Dog bones are found both inside outside and the fortress during the Roman period, but become more numerous inside the fortress during the Medieval period.

The extensive fishing industry in the city of Chersonesos has been documented, but little is known of rural fish consumption. Faunal evidence indicates the inhabitants of this rural outpost did indeed eat a lot of fish (more so in the fortress than the surrounding areas). The quantity of bones found declined slightly toward the early Medieval period.

There was a sizable number of bird bones excavated in the fortification area during the 1998 and 2000 seasons. The late Hellenistic and Roman periods saw a sixteen-fold increase in the percentage of bird bones compared to the surrounding areas. The quantity of bones at the summit fell in the Medieval period to equal that of the surrounding areas. [This could reflect a change in status from fortress to hamlet. *ed.*]

Various wild species—including hedgehog, hare, fox, red deer, dolphin, and turtle—were found more frequently at the summit than in the surrounding areas. This could indicate that hunting was a source of food for the inhabitants, if not the major one. (Bones of the hare frequently showed knife marks indicating butchery.) The dolphin and turtle bones might indicate organized fishing expeditions along the coast.

Taken as a whole, the osteological collection from Bezmyannaya suggests the following interpretation: the inhabitants, in general, raised sheep and pigs for their own consumption; cattle were raised primarily as a source of traction or

	Late Hellenistic 3rd – 2nd c BC	Late Hellenistic to early Roman 2nd c BC – 3rd c AD	Late Roman to early Medieval 4th – 7th c AD	Medieval 8th – 10th c AD
<b>Species, Domestic</b>				
Cow ( <i>Bos taurus</i> )	19/4	142/7	230/11	9/1
Sheep ( <i>Ovis aries</i> )	6/3	28/8	81/15	–
Goat ( <i>Capra hircus</i> )	3/1	29/4	46/6	–
Sheep/Goat	41/4	306/11	573	5/1
Pig ( <i>Sus scrofa dom.</i> )	4/1	48/4	17	–
Horse ( <i>Equus caballus</i> )	4/1	36/2	113/5	1/1
Donkey ( <i>Equus asinus</i> )	–	–	1/1	–
Dog ( <i>Canis familiaris</i> )	–	25/2	153/11	–
Cat ( <i>Felis domesticus</i> )	–	1/1	19/3	–
<b>Species, wild</b>				
Red Deer ( <i>Cervus elaphus</i> )	–	1/1	2/1	–
Red fox ( <i>Vulpes vulpes</i> )	–	–	5/3	–
Hare ( <i>Lepus europaeus</i> )	–	9/2	16/3	–
Hedgehog ( <i>Eri-naceus europaeus</i> )	–	1/1	2/2	–
Dolphin ( <i>Phocaena sp.</i> )	–	2/1	1/1	–
Turtle ( <i>Emys orbicularis</i> )	–	1	–	–
Fish ( <i>Pisces</i> )	1	22	32	–
Crab ( <i>Cancer</i> )	–	2	2	–
Bird	3	31	45	–
<b>Totals</b>	<b>81</b>	<b>688</b>	<b>1322</b>	<b>15</b>

Figure 1. Bones from Bezmyannaya, 1998 and 2000 excavations. (Shown as number of bones per minimum number of individuals.)

Species	Late Hellenistic and early Roman		Late Roman and early Medieval	
	Fortress	Surroundings	Fortress	Surroundings
Cow	36.9%	56.2%	48.4%	54.8%
Sheep	40.3	56.2	48.4	54.8
Pig	5.2	5.8	11.0	11.4
Horse	9.3	2.9	13.1	6.6
Dog	6.7	0.6	2.9	4.2
Bird	0.4	6.4	0.8	2.8
Fish	0.4	6.4	0.8	2.8
Other	0.8	2.5	0.8	2.7

Figure 2. Percentage of principal domestic and wild species in different epochs, Bezmyannaya excavations 1997 and 2000.

income and were slaughtered outside the fortress area. This supposition is supported by the finding of a majority of the bones outside the fortress area from inedible parts of animals, while inside, a majority were from edible animal parts (Fig. 3).

A more detailed look at the osteological evidence leads to the conclusion that the inhabitants inside the fortress consumed a diet indicating a privileged status. They ate beef in small quantities (Fig. 4), perhaps in a banquet setting, large sturgeon—assuredly a delicacy—as well as smaller, bony fish (possibly for soups).

Most of the bird remains in the area are from the Roman and early Medieval periods. A majority of these bones are of domestic chickens, with a smaller number of wild fowl including bustard (*Otis trada*), sparrowhawk (*Acipiter nisus*), partridge (*Perdix perdix*), horned owl, (*Athene noctua*) cormorant, (*Phalacrocorax carbo*), and tufted duck (*Aythya fuligula*). These species were identified by Dr. A. V. Panteleev, Zoological Institute, St. Petersburg.

Fragments of a tortoise carapace were found in first century AD deposits away from the fortified area. Dr. I. A. Danilov, of the Zoological Institute, identified the carapace as belonging to a marsh turtle (*Emys orbicularis*), and it is quite possible its meat was consumed as food.

Teeth and jaws of horses were found repeatedly among the materials from the excavation (Fig. 5). These remains were probably from the period spanning the mid first century BC to the third

century AD, although the contexts could not be well dated. These horses were probably used for transporting cargos and appear to have lived to an old age.

Oxen, probably used mainly to pull carts and plows, were found as well. The remains of some large bulls were found near the top of the hill (together with a small number of donkey bones). Again, the contexts yielding these finds cannot be securely dated, but they are likely of the Roman period.

One of two astragaloï, made from ankle bones of sheep, had a circular hole through it, possibly so it could be worn on a string as a pendant. (The hole was drilled from two sides, meeting in the middle; the drill bit had a cone-shaped tip and was probably made of stone.) The second astragalos (from the 2000 season, dated to the fourth century AD), was of either a sheep or a goat anklebone and had a smoothed lateral surface, possibly for use on a game board (Fig. 6). [In ancient Greece, astragaloï were often the possessions of young women and used in games of chance. They are frequently found among grave goods. ed.]

Two metapodia, one of a cow and one of a goat, were also found with drilled holes, probably resulting from a search for marrow. The cow metapodium was punched with a square hole in the forward wall of the lower part (Fig. 7 left), then drilled with a bit, possibly made of bone. The goat bone hole was made by a sharpened flat tool, most likely a knife blade (Fig. 7 right).

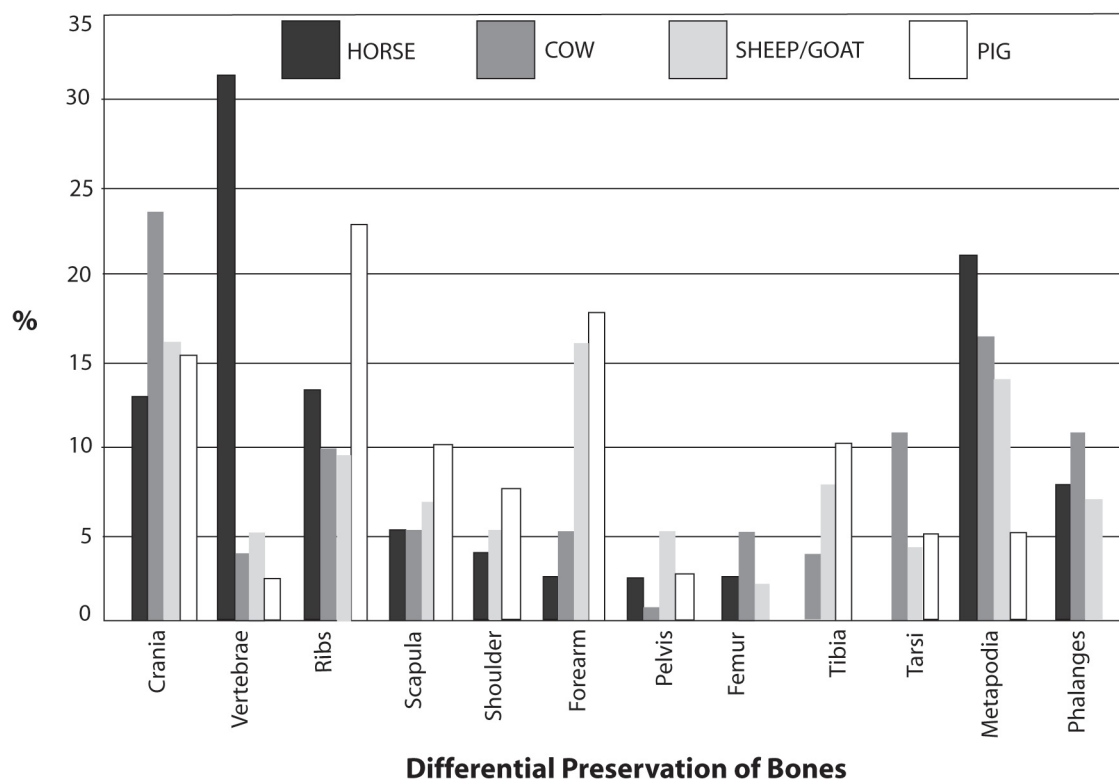


Figure 3. Ratio of bone types of the principal domestic species found around the fortress area during the Roman period.

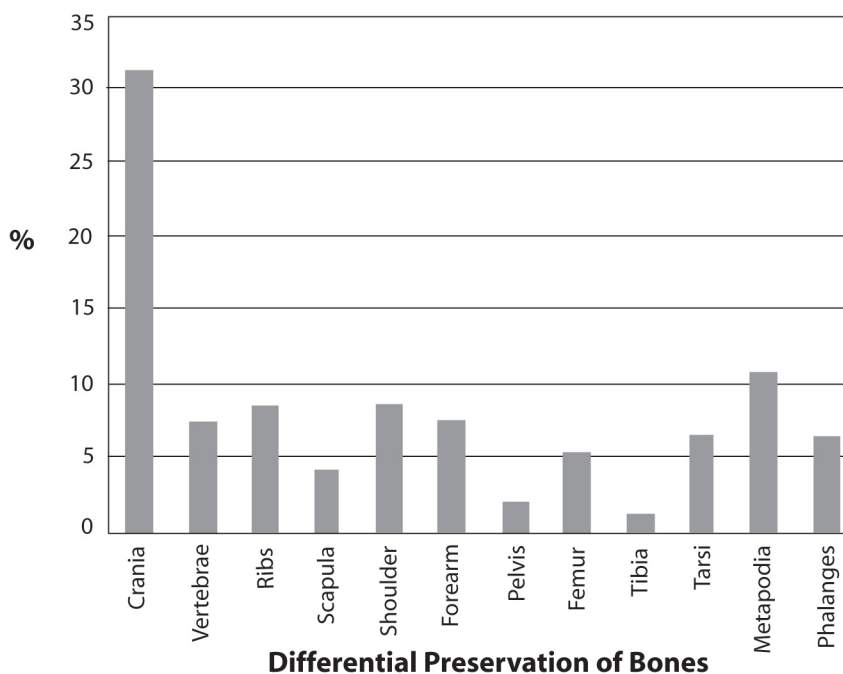


Figure 4. Ratio of cattle bone types found in the fortress during the Roman period.





Figure 5. The lower jaw of an old horse. The alveoli of the lower incisors have disappeared completely.



Figure 6. Two worked anklebones of sheep (*astragaloi*).

The lower part of a cat's shoulder (Fig. 8), found in 2000, showed traces of cutting. (The cat was probably a domestic pet.) The knife marks, made by a dull instrument, indicate the carcass may have been butchered to obtain bone material, judging from the evidence on the back side of the epiphysis on the articular surface. The worker of the bone might have been trying to work the diaphysis of the bone into a cylindrical bead. The more common source of these beads was from the diaphysis of

tubular bones of birds and hares. The bones of predators such as cats are thicker and more difficult to work, so the task was probably abandoned.

Two bone fragments from the 2000 excavation have rather interesting traces of cross cutting: one, a fragment of the diaphysis of a dog (Fig. 9), dated to the sixth century AD; the other, a fragment of the diaphysis of a goat or sheep radius, dated to the seventh to the ninth centuries AD. Tracological



Figure 7. Fragments of front metapodia of a cow (left) and a goat (right) showing drilled holes.



Figure 8. The lower part of the humerus of a cat showing traces of cutting.

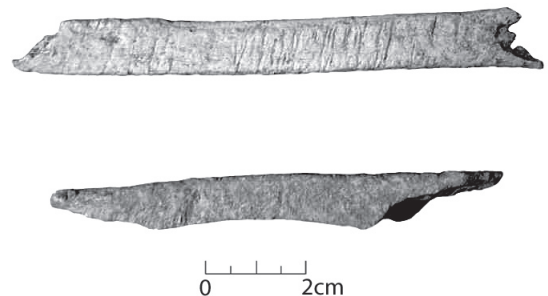


Figure 9. Two fragments of a dog radii. These fragments were possibly used as spools for thread.

examination of both fragments showed cross traces made by a knife, then smoothed, using the same tool. It is possible that these bones were used as spools or bobbins, with the notches added to keep the thread from sliding off. These may have been used as shuttles in a weaver's loom. This working hypothesis has not been confirmed with comparable material from Roman or Medieval finds, but similar objects, that is, large longitudinal bone fragments with multiple cross cuts, have been found at Bezmyannaya in earlier contexts (dated 3<sup>rd</sup>–2<sup>nd</sup> centuries BC). It may be that this type

of bone instrument has up to now escaped the archaeologists' attention. Tracological examination of the large worked bones, was carried out by Dr. T. A. Sharovskaya of the History of Material Culture, St. Petersburg.

These preliminary results, while suggestive of the activities and diets of the occupants of the hilltop fort and surrounding settlement, and of the natural wild fauna of the area of western Crimea, await further detailed studies, already under way, of the remaining faunal material from the excavations of 2002 and 2004.

## PRE-GREEK POPULATION ON THE HERACLEAN PENINSULA: CERAMIC ANALYSIS

Evelina Kravchenko  
*Inst. of Archaeology, Kyiv*

Few sites belonging to the pre-Greek population of the Crimea Peninsula, in particular from its extreme south western end have been systematically excavated, and even fewer have been published. The important site of Uch-Bash above the Chyornaya River on the eastern side of the Heraclean Peninsula (Fig. 1) is fortunate to have been well excavated, in the early 1950s, by the then Director of the National Preserve of Tauric Chersonesos, S.F. Strzheletskiy, who published a brief preliminary report. The ceramic finds from the site of Uch-Bash have been sadly ignored since the time of the initial study of this sort of material by H. K. Leskov in the mid-1960s.

As part of the project to study the interaction of Greek colonists and native populations in the chora of Chersonesos, initiated in 2003 and sponsored by ICA, the author was invited by the Director of the Preserve, L.V. Marchenko, to

prepare a study of the pottery from Uch-Bash for eventual publication. This work begun in 2003 by the author and Dmitriy Pefits was continued in 2004. This report presents some preliminary thoughts on the subject.

The material consists of the pottery from a series of pits excavated in 1952, and from two structures from the 1953 excavation in Square I: Structure 2 (Fig. 3, 4, and 5) and Structure 3 (Fig. 6). Structure 2 is quadrangular in plan, oriented on a N-S axis, with an area of 46m<sup>2</sup> measuring 9.25m by 5.0m. Built on the ground and not interred, as were many iron age dwellings in this area, it was a surface construction; its western side, was nonetheless, cut into the clay subsoil about 0.5m to level the floor. The rests of the floor and subsoil base of the western wall clearly defined the limits

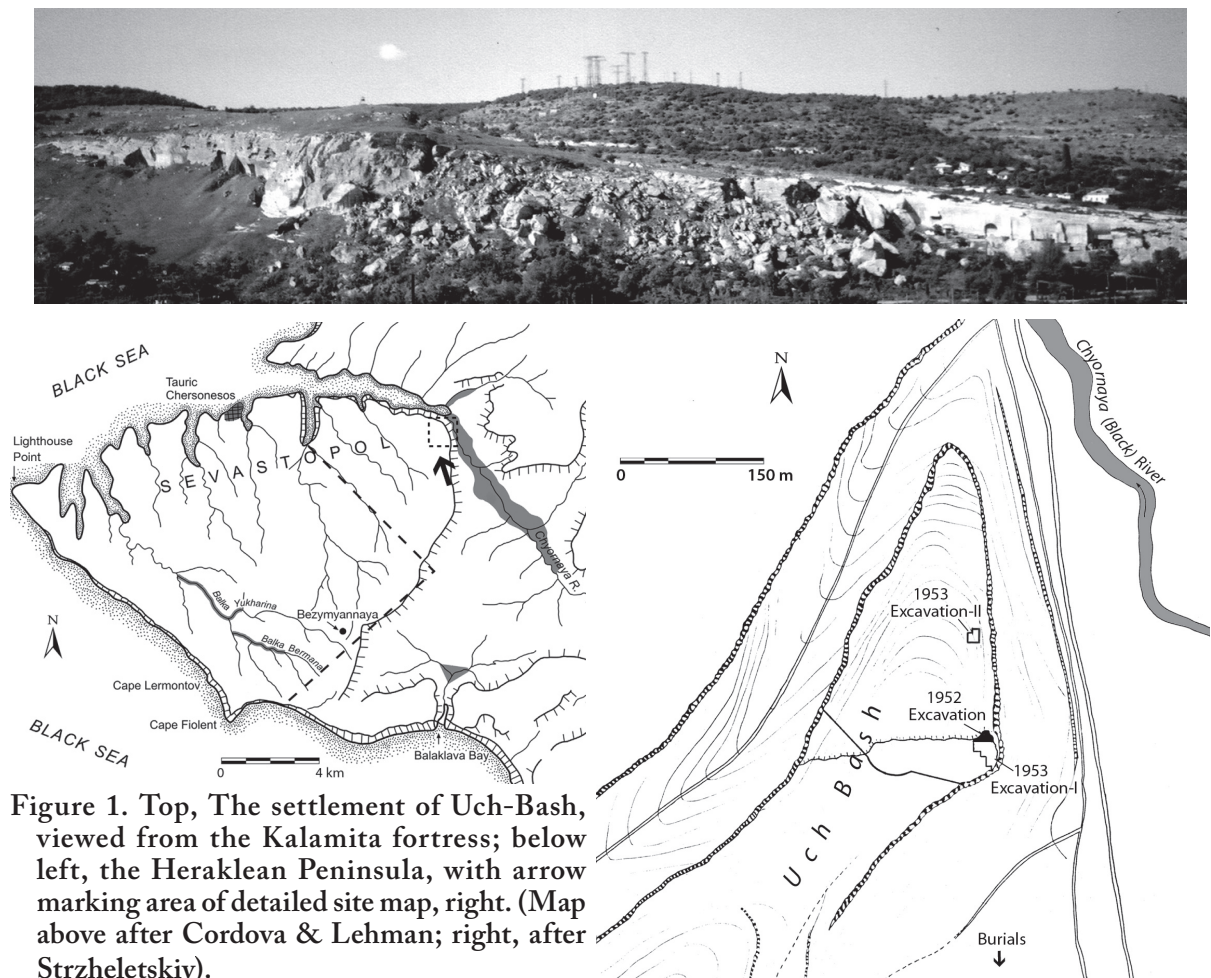


Figure 1. Top, The settlement of Uch-Bash, viewed from the Kalamita fortress; below left, the Heraclean Peninsula, with arrow marking area of detailed site map, right. (Map above after Cordova & Lehman; right, after Strzheletskiy).

of the structure. The floor was coated by clay; the walls, perhaps, were constructed like the walls of Structure 1. Unfortunately, the building was heavily damaged during World War II. Its entire floor displayed deep fissures formed by explosions. It is, therefore, not a closed archaeological complex. Despite the fact that the stratigraphic levels have shifted from one area to another over the floor, the main part of the material from the various levels could be sorted according to the soil types of the various levels. The lowest occupation level within Structure 2 can be dated from the end of the 11<sup>th</sup> to the middle of the 10<sup>th</sup> century BC.

Structure 3 is only partially preserved. Just 6.5 m of one wall has been completely uncovered and 1.6 m of a second wall. The area is delimited by the precipice which formed when the rock collapsed in 1941. This structure was cut into the bedrock 0.3–0.5 m. An ash layer with archaeological material which was lying directly on the floor of the structure was covered by soil mixed with rubbish dating to the time of the Crimean war, so we know nothing about the subsequent ancient layers. Fortunately the absence of evident damages such as cracks, and a well-preserved stratigraphy indicates that the ancient levels are in tact. The ceramic material from the layer over the floor is typical of a later period than that of the floor layers of Structures 1 and 2 and its documents the existence of later layers on the site. We conclude in a preliminary way that Structure 3 is synchronous

with the phase of Babadag III in the Danube region and dates to the time of Hallstatt (Ha)a.

The typology of Uch-Bash ceramics was elaborated on the basis of the analysis of craft peculiarities within typological characteristics such as shape and decoration. The same criteria were applied to all the objects irrespective of the frequency with which these objects appear in the record, and the typology is based on well-preserved objects. The main criteria are: (1) characteristics of manufacture, (2) the color of a vessel inside and outside, (3) presence of a slip or base coating of clay inside the vessel, (5) clay, (6) tempering, (7) firing, (8) color of clay, (9) hardness, as well as (10) mean thickness of the body. The analysis of shape and decoration has not produced any new and previously undescribed types but has shown clearly the functional types of vessels and confirmed the types established through analysis of craft technology.

On the basis of our research of the pottery from three structures of the Uch-Bash settlement, the following categories of ceramic vessel type by craft technology have been recognized:

Types A and B. Polished (types A1 [Fig. 3: 4–6; Fig. 4: 1–3; Fig. 5: 1–3; Fig. 6: 3–12] and A2 [Fig. 3: 7–11; Fig. 4: 4–9, 11, 12; Fig. 5: 4–9]) and unpolished [types B1 (Fig. 3: 1–3; Fig. 6: 1, 2) and B2] pottery are presented by pot-shaped and barrel-shaped vessels, jars, bowls and bowl-shaped

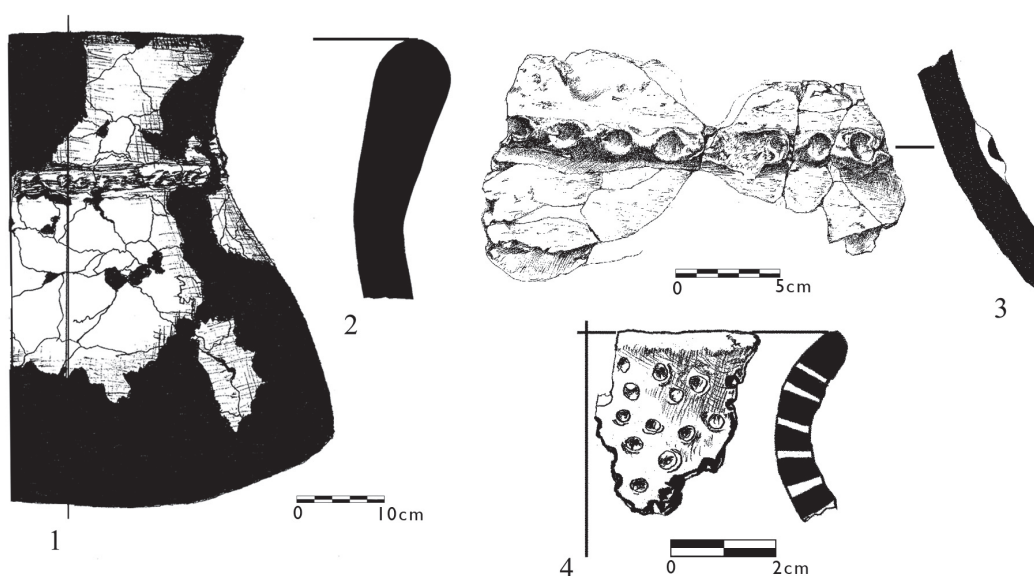


Figure 2. Vessels (types C and D) from structure 1.



vessels, scoops, basins, cups and tiny cups. They use the same clay and the manner of making out- and insides is closely comparable. The brown (A1 and B1) and brown-gray (A2 and B2) fabric is well-tempered with sand, crushed shell, and sometimes with ochre; unpolished vessels are tempered with these inclusions, as well as with some additional large-grained sand and rotten limestone, and well-fired. Vessels which were made of brown-gray paste (A2 and B2), tempered with ash, have a light-colored (light-beige or light-brown) slip outside and the Interior slip is the same color or a light red.

Type C. Household pottery is represented by so-called “pithoi,” a large vessels with thick walls, narrow neck, slightly out-turned rim, and a wide body. Such vessels have coarse unpolished bodies. The color of paste is fulvous, the paste

is little-structured, light-weight tempered with sand, large-grained sand, lightly crushed shell, as well as with a little part of rotten indigenous limestone and a large part of straw. As usual, the vessels are decorated with an applied large flange ornamented with finger impressions. Probably these vessels were used as containers including containers for raw materials in ceramics craft. Finds of such vessels belong to Structure 1 (Fig. 2), and date to the period from the end of the 11<sup>th</sup> to the middle of the 10<sup>th</sup> century BC based on associated material.

Type D. “Strainers” are represented by pot-shaped vessels or basins perforated right through. Through holes were made on the whole fragment or well-preserved vessel down from the rim or edge. The surface of the vessels is coarse, the edge is slightly smoothed paste and tempers are identical with

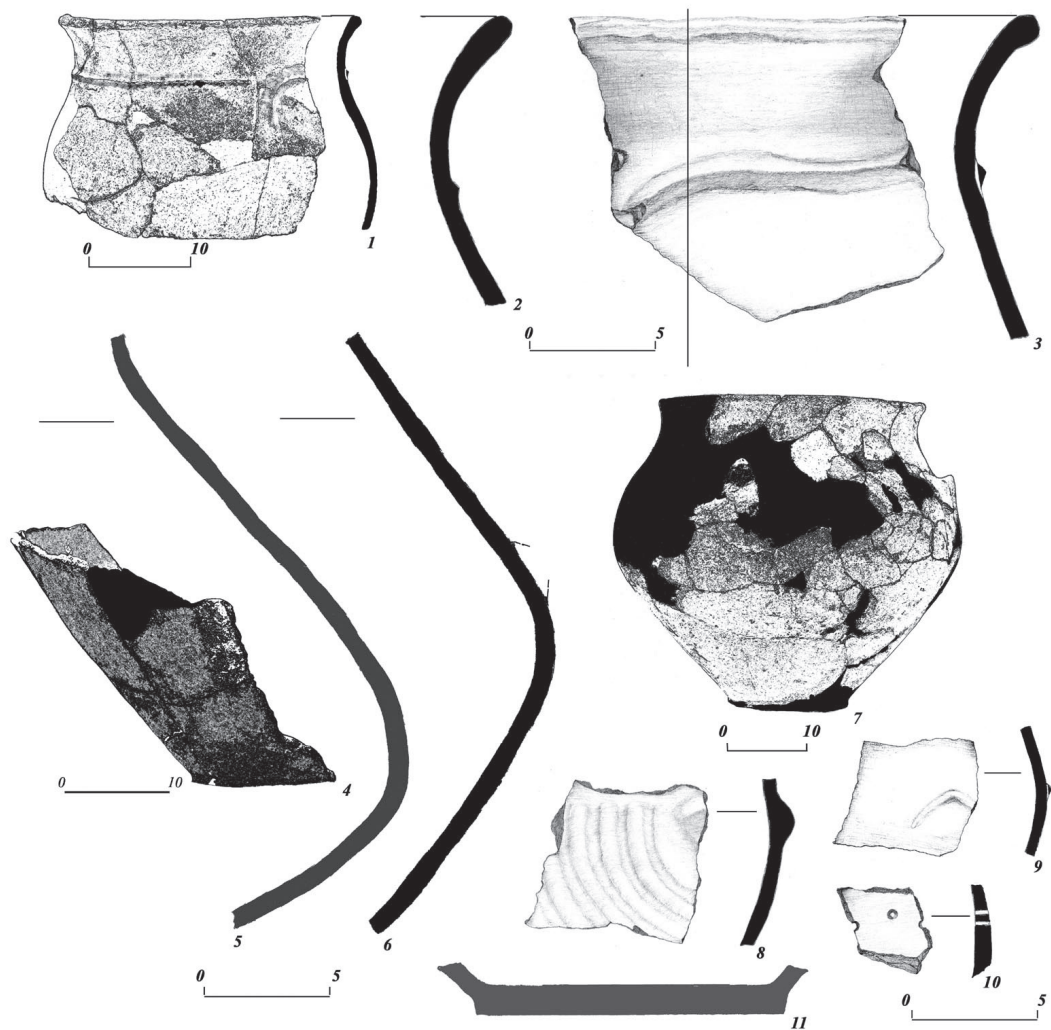


Figure 3. Pottery from structure 2.

the pithoi vessels except for the straw. This type vessel is fired better than type C. Perhaps these were used for straining the whey from milk when making cheese. Vessels are present in Structure 1 (Fig. 2: 4), among the material from several pits with ash-and-rubbish filling and from the layer in which part of the structure were recovered. The presence of such a broad range of this type makes exact dating difficult and the chronological range widens from the end of the 11<sup>th</sup> to the end of the 9<sup>th</sup> century BC.

The polished vessels, table wares, of these types are characterized by thin walls of the body and qualitatively polished.

Unpolished vessels have an applied, raised decorative band, or flange, around the neck which does not completely encircle it. Sometimes the ends turn down. Polished vessels have flanges decorated with incised rubbings on body or rim.

One fragment of a pot-shaped vessel or bowl with short neck is atypical for the complex of Structure 2. It is decorated with finger impressions on body and should be connected with type A2 (Fig. 4: 10). Composition of clay and type of decoration of the fragment suggest later dating or at least a different date than that of finds from Structure 2.

Types A and B are typical of the ceramic assemblage from the Uch-Bash settlement. These types are present in the earliest known contexts on the site without ceramics of other types. This includes Structure 1 which dates to the Babadag I/II period (the 11<sup>th</sup>–10<sup>th</sup> century BC). Most of the vessels from Structure 1 were made in such a manner and date to the Babadag Phase (from the end of 11<sup>th</sup> to the mid of 10<sup>th</sup> century BC). Probably Structure 2 was synchronous with Structure 1 or appeared immediately afterward. Structure 2 was covered by a layer of material dating to the late Chernoles period on the basis of an ivory three-hole harness of the Chernogorovka period. As Structure 2 is not a closed context, it can not be considered as a standard. We should point out that the fragments which were decorated with flange and connected with the type B1 pot-shaped unpolished vessels were found on the floor of Structure 2.

Types A3/4 includes fragments of vessels made from gray-black clay well-tempered with sand, crushed shell, large-grained sand, or rotten limestone. They have fine black polishing outside. The interiors of the vessels sometimes have a light-colored slip, which is evidence of the influence of the Hava (Hallstatt) culture on the making of pottery. Decoration of such vessels more often consisted of rubbings made with a blunt tool, the

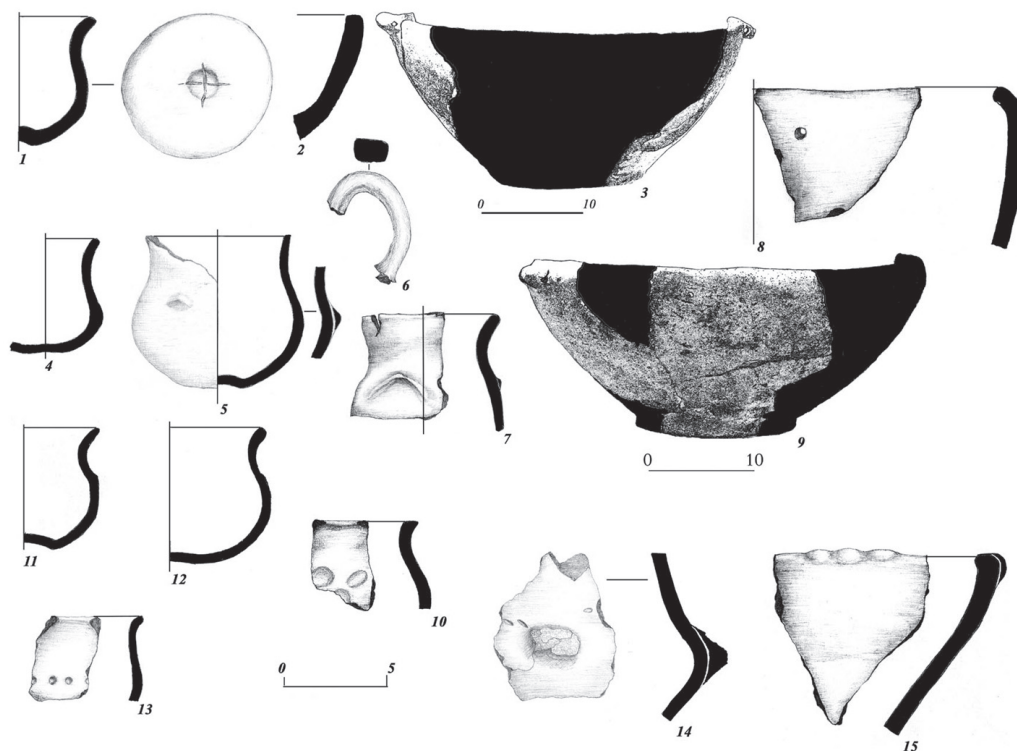


Figure 4. Pottery from structure 2.

so-called “parquet”. Such early types are among the material from Structure 1. Types A3 and 4 are present in the layer that completely covered the structure. The decoration and shape of these types have analogies in the pottery of grooved ceramics cultures of early Thracian Hallstatt time—the Babadag II and Insula Banului groups. So, the structures destroyed by fire were covered by the layer formed around the 10<sup>th</sup> century BC. Some fragments from Structure 2 are connected with types A3/4. Accordingly, the technique is the same but they are not decorated with grooves. Their decoration is on Fig. 4: 13–15.

Materials from the excavated structures of the Uch-Bash settlement have no discernible evidence of influence from the Sakharna culture, which can be seen in ceramics of the nearby Sakharnaya Golovka and Inkermanskoe settlements. Thus, the lower layers of Uch-Bash are probably contemporaneous and date to the years from the 11<sup>th</sup> to the 10<sup>th</sup> century BC.

The fact of typological division of the ceramic assemblages of the Uch-Bash pits is of special interest. This material shows a very different technology resulting in manufacturers of higher

quality ceramics as seen in the preparation of clay for modeling, conditions of firing, and manner of polishing. At Uch-Bash we can see the decline in the traditions of decorations of ceramics. Such pottery is found among vessels decorated with obliquely drawn lines and borders indicated by pricks that are typical for a number of settlements of Kizil-Koba culture in the middle phase. As vessels are connected typologically with the pottery layer discovered over the destroyed structures, it maybe that this group, connected with Kizil-Koba culture of the Early Iron Age, became the main substratum for the population of Crimea. Absolute dating of these complexes is unfortunately, however, not very precise at present. They are either contemporaneous with or follow directly the period of Sakharna cultural influence on the pottery assemblages of Western Crimean settlements. They apparently come into existence earlier than elements of the Sakharnaya Golovka and Inkermanskoe settlements, which include pottery decorated in the manner of Bassarabi-Sholdaneshty.

Of special note is the fact that unpolished, so-called cooking pottery from all three structures of Uch-Bash, which indicate Late Bronze Age basis

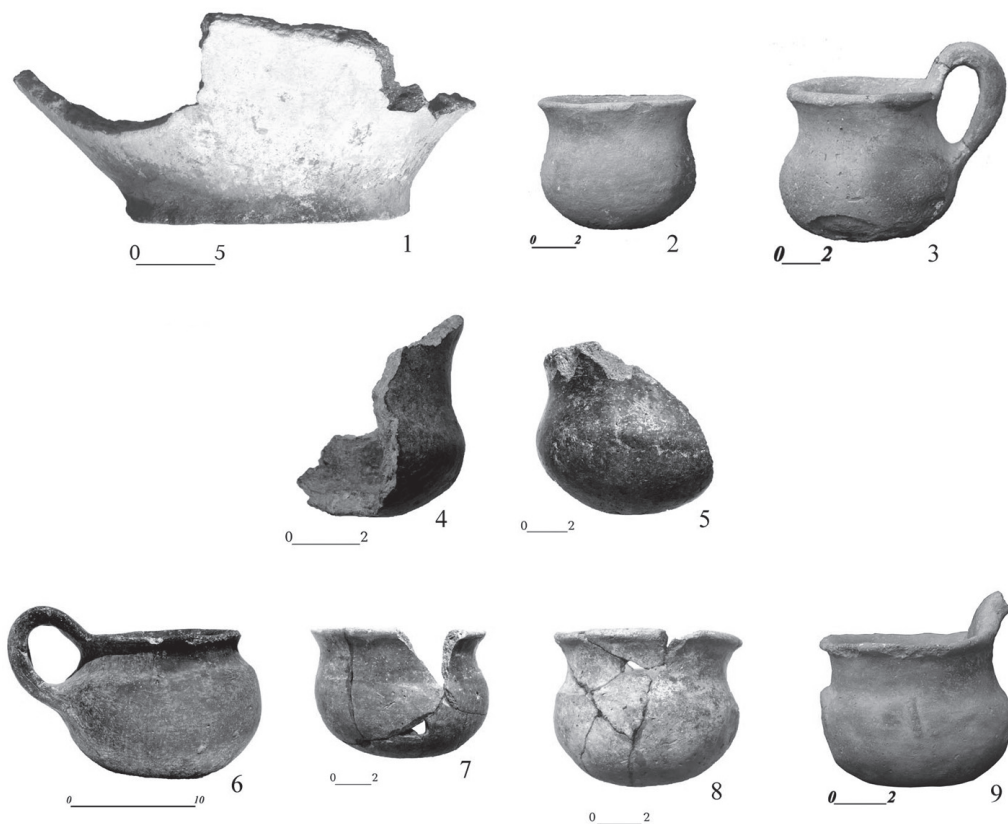


Figure 5. Pottery from structure 2.

of Early Iron Age culture of Crimea, are linked with Belozerka culture of the Northern Black Sea coast region. Two slightly shaped fragments of pots were found in the floor layer of Structure 3. Pot-shaped vessels and a number of tulip-shaped pots are among the material from Structure 1, while only pot-shaped vessels were found in the layers from Structure 2.

While these are, at best, preliminary conclusions, they are a first step in what we hope will be a revival of interest in the pre-history of the extreme western tip of Crimea, and a stimulus to further documentation and study.



Figure 6. Pottery from structure 3.



The aim of the 2004 site conservation season, both at the excavations in the city and at Bezymyannya in the chora, was first, to assess the success of the conservation trials applied in the preceding season; and second, with an increased understanding of the local environment deduced from the observed results, to begin designing a single treatment methodology that can be universally applied across the city and chora sites. This, we hope, will bring continuity of conservation and interpretation to all of the monuments of NPTC far and near.

The results of the one-year trial period begun in 2003 revealed that the environmental conditions at the coastal city site and inland site of Bezymyannya (at 240m above sea level) varied very little, at least in their potential for erosion of conservation mortars. Deterioration at both test sites followed identical patterns, with purely lime based mortars faring worse; those containing a proportion of both

white cement and lime resisting better, while those using only white cement suffering little damage at all. On close examination it could be seen, however, that the pure cement mortars were too “hard” for the substrate to which they were being applied, resulting in pulverization of the stone surface parallel to the mortar application. This was surely the result of water retention due to reduced porosity and subsequent freeze thaw cycling.

The addition of crushed brick or “basalt” fibre appeared to be of no apparent benefit to the integrity of the mortars, nor was the addition of “basalt” netting to the wall capping. However, these materials may still be of long-term benefit. While their use was suspended in 2004 due to the additional time required, the 2003 test areas were left untouched in 2004 to see if the further weathering of a second annual weather cycle would reveal any significant longer term benefit from



Figure 1. Conservation team members working at the city site.



**Figure 2. Pointing team applies mortar to an ancient structure at Chersonesos.**

their inclusion.

Of the 2003 test mortars, the sample containing both lime and cement proved the most promising. While this mortar had in places failed, it had not lost its overall structural integrity and still fulfilled its function as a consolidant for the structure. The cement content of the mortar was one part to seven of aggregate and it was felt that if this fraction were increased slightly the resulting mortar would retain the required porosity while surviving in the ambient environment. Support for this hypothesis came from the work undertaken in previous years by Vera Nikolayenko and her team on the excavated sites at Area 10 in the chora. Their experience led the conservators to decrease gradually the cement content in conservation mortars without suffering a decrease in performance. The chora conservation is currently using a mortar with a one-to-five proportion of cement to aggregate and have felt this could be reduced further. The mortar to be used in the 2004 site conservation contained a one-to-six cement to aggregate content. The size of the aggregate and the material were the same as used in the previous years' trials and these produced the most acceptable visual appearance.

The work undertaken in 2003 to find reliable sources for conservation materials, the investment made in equipment, and the experience gained in the preparation of mortars and correct application paid dividends in 2004. The returning members of the 2003 team quickly trained the new members and the level of productivity began to rise immediately. In 2003 the team was comprised mainly of visiting western personnel. In 2004 it was comprised of predominantly Ukrainians, both students and local people. This intentional bias results from ICA's aim for locally sustainable conservation projects and it is hoped that these individuals will go on to form the core of the future conservation team at the NPTC as the input required of ICA decreases. Initially there was a problem with continuity of the local workforce, but in the second half of the project this settled down and a very good workforce emerged. For the last few weeks of the project, the team in the city worked independently from the ICA team in the chora with no loss of quality or productivity.

The conservators concentrated on pointing wall elevations and capping wall tops. Unlike 2003, there were no vulnerable floor surfaces that needed protection and as the area undergoing treatment was comprised of buildings, courtyards, and roads prior to the application of ground treatments, it will be necessary to devise a convention of floor treatment types that, while suppressing plant growth, will aid in the interpretation of the differing historical uses of these spaces.

The choice of ground treatment in the area currently being conserved will have ramifications across the entire site. Roads, internal spaces, and courtyards need to be visually distinct if visitors are to be able to understand correctly the original function of the structures within the overall context of the site. These decisions ideally should be made in a broader forum involving those responsible for the overall interpretation and presentation of the site. Much discussion on this point occurred in 2004 and various schemes were proposed. As the floors in the areas currently being excavated are a low priority for conservation, the vulnerable structures should be conserved first prior to any treatment to the floors, thus allowing time for further discussion of the problem. Once a firm convention for floor treatment is established this will become a test area.



The 2004 season went a long way towards treating the backlog of conservation required in the area currently being excavated by ICA and NPTC. All areas excavated in previous seasons are now treated and of those unearthed in 2004 all of the vulnerable areas have been secured. The 2005 season will, we hope, again run for at least a month longer than the excavation season so that by the end of 2005, site conservation will have caught up with excavation. In the future, all structures should be conserved during the season they are excavated.

The site survey and conservation recording methodology is now fully developed and is being routinely applied to site conservation to record the conditions pre-conservation and again on completion of the work. Those undertaking the site conservation work are fully trained in the recording methodology.

The future aims of the city conservation project are as follows.

- To consolidate the work already initiated into an organized strategy of conservation, adopted by the Preserve as an official conservation strategy.
- To develop further the conservation strategy as part of a site interpretation plan, therefore

using conservation methodology as a tool to differentiate between structures of varying occupation periods and function.

- To develop contacts between NPTC and the international conservation community through literature, organized training, and contact with conservators working elsewhere on similar projects worldwide.
- To achieve complete sustainability of the project by the Ukrainian workforce.

### Conservation in the Chora

Excavation at the Bezymyannya site continued in 2004, requiring further conservation on this site to stabilize all exposed structures. In 2003 conservation at Bezymyannya had been limited to the application of mortar trials, some of which had subsequently failed. Given that the results of the trials had been identical both at Bezymyannya and in the city, we decided that the failed tests at Bezymyannya should be replaced, using the mortar developed in 2004.

All the exposed structures at Bezymyannya are now treated and the work recorded. They should remain stable for the foreseeable future, but will be monitored to assess the longer term performance of the conservation methodology.



Figure 3. Laying geotextile to control plant colonization.

For the first time in 2004, conservation work at a Chora site was undertaken using identical methods to those employed in the City. The work was carried out by personnel from both the conservation team working on the structures on the city excavation and those working with Vera Nikolayenko on the structures in Area 10. “Cross pollination” of ideas, methodologies and experience lead to noteworthy increases in both productivity and the quality of the work.

The future aim of the Chora conservation project is as follows

- Full integration of the city and chora projects into one entity
- Expansion of the survey and recording methodology developed in the city to the sites in the chora using sites of the Archaeological Park (Area 10) as a test bed.
- Full conservation survey and recording of Area 10.
- Introduction of a conservation plan for Area 10 using the same criteria and methodology as adopted in the city.
- Full sustainability of the project by a local workforce



Figure 4. Team members build a temporary rubble retaining wall to stabilize an earthen bank.



## SITE CONDITION SURVEY

Chris Cleere & Jessica Trelogan

Understanding the condition of a site and the types and extent of destructive forces acting on it is the first step in the development of a successful and sustainable conservation plan. It is also a requirement for successful nomination to the UNESCO World Heritage List. The development of such a conservation plan can be a daunting, if not impossible, at sites on the scale of Chersonesos. Systematic and detailed condition surveys are in fact seldom undertaken on large archaeological sites due to the level of human resources required to collect such a large amount of information and the problems in managing, accessing, and visualizing this information in a way that allows meaningful conclusions to be formed.

To address this challenge at Chersonesos, a the NPTC and ICA undertook the designing and testing of a condition survey system in 2003. This survey system was further tested in 2004 and then used to undertake a condition survey of all exposed structures at the city site.

### General Survey

Because of the vast scale of Chersonesos, it soon became obvious that it would be an enormous, if not impossible, task for an individual or team of conservators to form an objective opinion of the existing condition of the site without a systematic survey. The occurrence and level of deterioration are so pervasive that one is overwhelmed and left with the view that everything requires immediate interventive conservation. While this is in reality not far from the truth, it is of no help in determining the resources needed, the time frame required, or the order in which to proceed.

It was therefore decided that the systematic collection and interpretation of relatively unbiased data pertaining to physical extent, condition, and rate of deterioration of the structures become a crucial first step for the correct selection of conservation treatments, conservation material type, order of treatment progression, and extent and scale of intervention required. The initial data

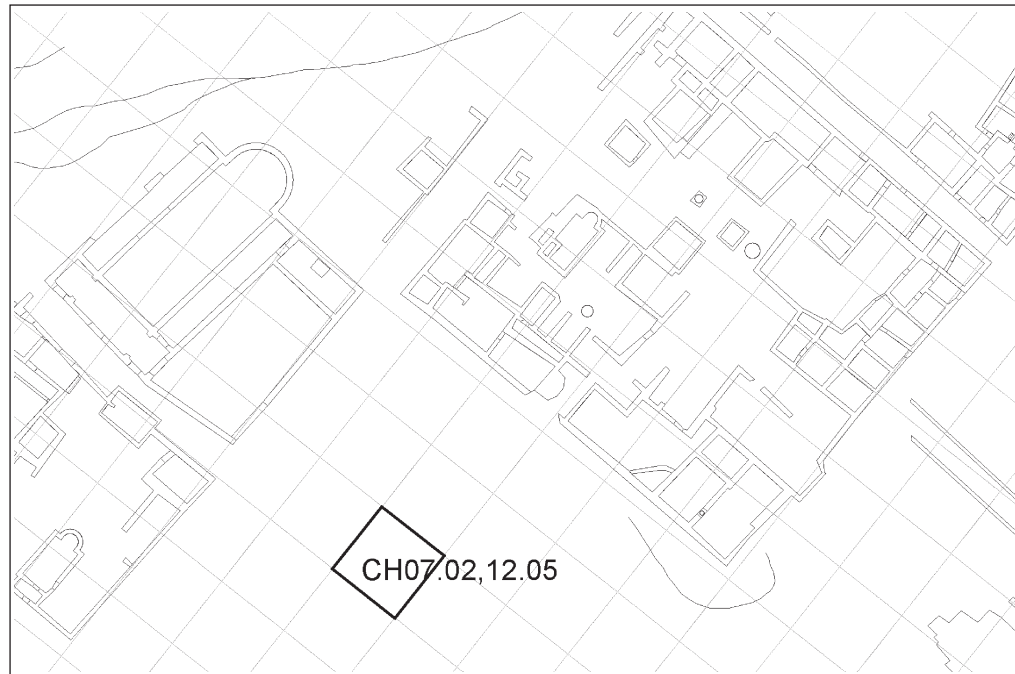


Figure 1. City map with 10 m<sup>2</sup> grids, showing highlighted square and location reference.

would thus form a baseline by which, through repetition of the process, improvements to the overall condition and the success and suitability of treatments can be assessed.

As a precursor to the survey, significant time was spent walking through the site to familiarize the surveyors with the types of problems occurring. The findings were discussed with the NPTC staff, who, long familiar with the site, have intimate experience of the progression of deterioration. Combining the observations of the specialists with informed local knowledge produced a good overview of the likely root causes of problems, but it was agreed that a more systematic and objective approach was needed. The results of this appraisal were then used to develop a strategy for the survey and a preliminary set of evaluation criteria to be tested in a pilot project. These strategy discussions proved invaluable in developing the following methodology for the recording system.

An arbitrary, regularly spaced 10 m<sup>2</sup> reference grid was established over the site, to which the general survey information was linked (Fig. 1). The reference grid not only allowed the positioning surveyors in the field but also allowed the site to be broken up into manageable areas of equal size, assessed regardless of location, historical period, or type of structure.

A score sheet based on the evaluation criteria was created which contains basic information relating to the overall condition and construction of structures within each 10 m<sup>2</sup> plot. Because of the international nature of the team, the use of written comments was kept to a minimum and scores were based on a numerical scale. The sheets themselves were limited to one side of an A4 sheet of paper to facilitate logistics in the field (Fig. 2).

Conservation Condition Survey														
Grid Reference:														
Area Description:														
<b>Materials</b> (circle as appropriate)														
Marble	Brickwork	Rubble	Ashlar	Ceramic	Other (specify):									
<b>Conservation</b>														
Has any previous conservation been undertaken?   Y   N														
Wall Tops	Worst	0	1	2	3	4	5	6	7	8	9	10	Best	N/A
Elevations	Worst	0	1	2	3	4	5	6	7	8	9	10	Best	N/A
Foundations	Worst	0	1	2	3	4	5	6	7	8	9	10	Best	N/A
Floors	Worst	0	1	2	3	4	5	6	7	8	9	10	Best	N/A
Aesthetics	Worst	0	1	2	3	4	5	Best	N/A					
<b>Level of Contamination</b>														
Trees	Bushes	Weeds					Percentage of coverage:							
Rubbish	Low	0	1	2	3	4	5	High						
Graffiti	Low	0	1	2	3	4	5	High						
Hazard? <input type="checkbox"/>														
Date Surveyed:										Surveyed by (initials):				

Figure 2. Final version of the survey recording form.

As the aim of the general survey is to guide conservators to structures in greatest need of attention, the scores given were based on the worst example of each criterion within the square. (If the scores were based on the *average* condition across the whole square, a wall collapse in dire need of conservation in an area in otherwise good condition would be missed, for example.)

Field trials confirmed that a 10 m<sup>2</sup> area could be examined and recorded in approximately five minutes; thus it seemed that an annual collection of required data for the entire site would be a viable option. Various combinations of teams were then tested and it was finally agreed that a team of three people, two closely examining the structures and the third filling in the form after discussion, produced the most consistent results in the shortest time, eliminating errors resulting from an individual surveyor missing a crucial area of deterioration.

### Detailed Recording

Based on the results of the general survey, detailed recording was conducted on the areas identified for interventive conservation. A set of high resolution digital photographs was taken of all structures or parts of structures (wall tops, elevations, floors, road surfaces, etc.) prior to any conservation, and again from the same vantage points after the conservation treatment. These photographs comprise the basic conservation record and can be linked to the corresponding section of the structure as mapped within the GIS, allowing an easily-accessible visual reference to the conservation treatments applied throughout its history. A mapping convention was established in the development of the GIS in which each structural element is represented as a set of distinct lines. By clicking on individual wall faces or floor surfaces on the digital map, the user can view photographs of their state at the time of survey and pre- and post-conservation. As this information can be rapidly collected in the field, the conservators are able to quickly re-examine pre-conservation photographs during the conservation process to ensure, for example, that any material that fell prior to conservation or was removed as part of the conservation process is replaced exactly in its original position.

A database is also being developed for conservation treatment types that can be linked via individual structural elements (as was done with the photographs) to the GIS, allowing spatially-based queries of specific treatment types and their long-term success. This may help shed light on some of the underlying causes of deterioration and the appropriate treatments for specific areas of the site.

### Results

The general survey along with the input of all collected data into the GIS was completed in a two-week period by 6 people, making an annual site condition survey realistically achievable, given the level of resources available.

A comprehensive picture of the state of conservation across the site can now be easily built and be used as a tool for formulating the conservation program.

Within the GIS, the map can be queried to show the condition of any combination of elements, such as all of the areas where the capping is in bad condition or the areas of the site where mortar is failing in the elevations. These data can be used to formulate longer-term strategies and assess the success or failure of the conservation methodology. It is important to remember that, while the survey considers the site broken into a 10 m<sup>2</sup> grid, it is not the aim to treat every structure in the square, but to indicate which areas of the site are in need of conservation. Once the critical areas within the square are stabilized the square is reassessed and is given a new ranking. An overall improvement to the condition of the site will be achieved by small, low-cost, targeted interventions, not by the conservation of large areas.

### Future Work

It is planned to repeat the survey in 2006 to begin the process of assessing the overall baseline rate of deterioration of the structures on the site and utilize the GIS to look for possible environmental factors (e.g., prevailing winds, salt spray, height above sea level) that may be exacerbating particular problems. If little variation in areas untreated since 2004 is found after a two-year period, the survey frequency will be reduced. If drastic change is revealed the frequency will be increased.

As a further refinement of the overall site conservation project, attention will be focused on the detailed condition recording system for structures prioritized by the general condition survey. The development of an expandable glossary of condition terminology relevant to the material types and processes of deterioration present will be expanded. The general survey, recording system, condition glossary, mapping convention, and list of accepted treatments will form the basis of a conservation field manual that it is hoped will be adopted by the NPTC as the official conservation field manual for all sites within its jurisdiction.

Further evaluation and modification of adopted conservation treatments will be carried out with the aim of creating an official list of accepted treatment types for structures on the site.

As the creation of a locally sustainable conservation plan is a high priority, NPTC staff continue to be involved in all aspects of the development, implementation, and interpretation of the conservation survey system. NPTC staff receive on-the-job training, and it is hoped that this will be complemented by a structured training program conforming to an internationally accepted standards, ensuring the continued success of the conservation project as ICA's role diminishes.

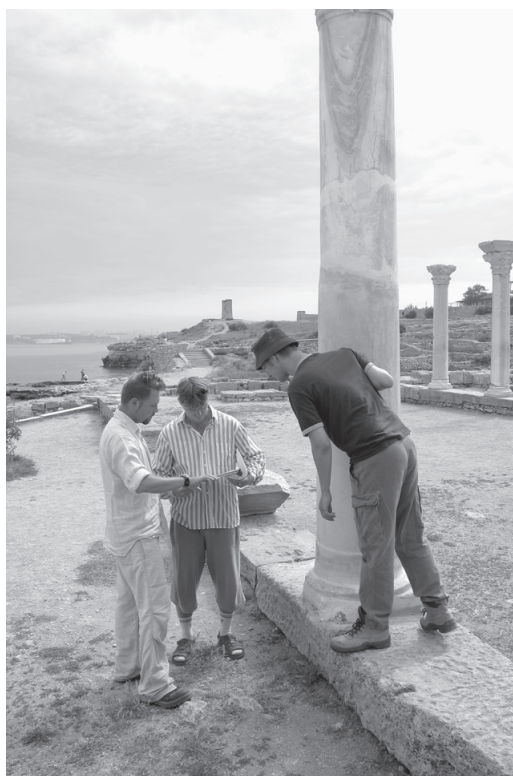


Figure 3. Members of the conservation team fill out a survey form on the city grounds.



Throughout the 2003 ICA Chersonesos excavation season, the conservators from the ICA team and the conservators from the NPTC conservation department discussed in depth the conservation requirements for the joint NPTC–ICA excavations of the 2004 season. The department is responsible for both maintaining the collection of the museum and for the treatment of all artifacts recovered from excavations carried out within the area of the preserve. The workload is extremely heavy and its funding, equipment, and available resources are quite limited.

With the lack of any environmentally controlled storage facilities or access to archival quality packaging materials, it is not surprising that the conservation department is continually forced to compromise on “best practice” in an attempt to keep up with the workload.

The ICA team, in response to the obvious needs of the NPTC, included in 2004 professional archaeological objects conservators and advanced archaeological conservation students. In addition to

supplying personnel, ICA made modest investments in conservation equipment, chemicals, archival quality packaging, and storage materials.

In the space of two months the NPTC conservators transformed the department, increasing productivity, the standard of recording, the standard of preservation packaging, and its own involvement with the archaeological process.

### Methodology and Recording

As a national archive, the NPTC has set procedures regarding approval of conservation treatments and recording methodology for all material accessioned into the museum collections. There is an official list of approved treatments for all types of materials, treatments applied to objects having to be recorded on one of two official record forms. A short form for the everyday material recovered from archaeological excavations and a long form for important objects or those categorized as national treasures.

New materials and treatments introduced by the ICA conservators were generally limited to variations in currently approved techniques and were restricted, in the main, to fillers for adhesives—such as glass micro-balloons—and variations in chemical structure of acrylic consolidants already in use at the NPTC. The adoption of new treatment types and materials did not become a problem, as all the conservators involved understood the underlying material science governing the treatment choice and were therefore able to “speak the same language” when discussing treatment options.

It is a requirement for the NPTC conservators to use the existing paper based recording system for all new material being accessioned into the museum collections; the system is well designed and is proven over many years. As the NPTC forms contain all the conservation information ICA requires for its own records, to avoid wasting resources by duplicating records in two

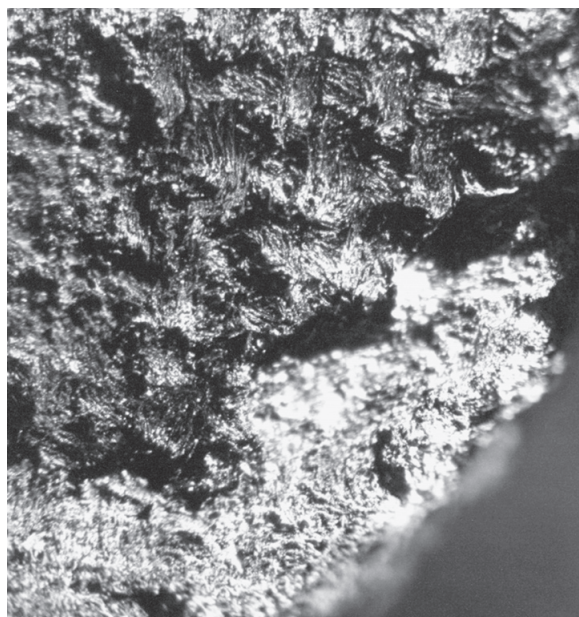


Figure 1. Microscopic cleaning revealed mineral-preserved textile on copper alloy artifact.

parallel recording systems, it was decided that the NPTC record forms should become the basis of the recording system adopted by ICA. Recording conservation treatment was therefore achieved by digitizing the NTPC short form and translating it to English. The forms for each find from the ICA–NPTC excavations could then be completed in Russian or English dependent on who undertook the work and translated to give a complete record in both languages.

### Designing the Project

The timing of the objects conservation project was dictated by the timing of the excavations. While it normally takes a few days before substantial finds will start to emerge from an excavation, one can almost guarantee that if the conservators are not prepared, finds requiring conservation will emerge in a great number from the topsoil leading to backlogs that can slow feedback of information to the archaeologists undertaking the excavation. As the project was further complicated by the need to assemble equipment and materials at the site and integrate the ICA conservators into the already overcrowded conservation facility; good preparation became critical. Prior discussion and planning with the conservators from the NPTC eased the process immensely and the required systems were all in place long before any backlog of material requiring treatment could build up.

Prior to the start of the season, the NPTC conservators and the ICA team estimated the minimum level of equipment and supplies required to undertake the project and designed a basic toolkit for each conservator, based on the individual sub-disciplines. Agreement was reached regarding the number of extra personnel required to undertake the work, how tasks would be apportioned, and where the work would be undertaken. As a result of forward planning, the object conservation project got underway on time and encountered no real issues throughout its course, a testament to the professionalism of all involved.

### Conservation

The combined team of NPTC and ICA conservators provided full-time on site and laboratory based conservation, over a two-month period of the ICA excavation season, to both the City and Chora (Bezmyannaya) excavations. Discussions among archaeologists, artifact experts, and conservators led to on site artifact recovery, handling and temporary storage systems that ensured that no material suffered deterioration on the way to the conservation laboratory. The conservators were also heavily involved in the recovery of delicate artifacts, undertaking on site pre-lifting consolidation of fragile artifacts and block lifting of artifacts deemed too fragile, vulnerable or time consuming for excavation on site. Useful information was also added to the archaeological record through the micro-excavation of lifted material.



Figure 2. In-situ consolidation of fragile organic artifact prior to removal to the conservation laboratory.

Large quantities of a variety of organic and inorganic material—including charred construction timbers, iron fittings, copper alloy tools, coins, ceramics, worked bone, and even belongings of second world war combatants—passed through the conservation laboratory.

By the end of the season, all the material recovered from the city excavations had been stabilized, cleaned, reconstructed, recorded, and packaged, in accordance with internationally approved standards for archaeological conservation.

New methods were introduced. In particular, the introduction of X-radiology for iron objects, greatly improved the treatment of this material. Identification of objects prior to cleaning was now possible and material of little worth could be archived without cleaning. Important artifacts could be cleaned more accurately using the X-ray plate as a guide. The availability of archival packaging materials also increased productivity

as some complicated and time-consuming stabilization treatment no longer had to be undertaken.

In some cases, conservation can obscure or remove information vital to fully understanding the technology that produced an artifact, or the specific use for which an object was employed. As some objects from the excavation have yet to be studied in depth, material requiring further research was left untreated and correctly packaged to ensure survival.

### **Final Assessment and Future Goals**

The success of the 2004 project goes deeper than merely achieving conservation goals. A bridge between conservators trained and working in the West and their colleagues trained and working in Ukraine was firmly established, resulting in a unique opportunity for exchange of information, techniques, and discussions of philosophy and ethics of conservation to take place between



**Figure 3. NPTC conservators at a seminar on the use of BTA treatment for copper alloy artifacts.**



professionals from both schools. This is particularly valuable because while western conservation is well published and widely available, the necessary publications and periodicals, however, rarely reach Ukrainian conservators. The Chersonesos objects conservation project has become a unique forum for communication.

It is the aim of the conservation team in 2005 to establish a treatment database for conservation recording. In 2004, the first year of the joint objects conservation project, insight was gained about the level of recording the project and the NPTC in general required, and therefore the parameters required by the database. Digital photography for recording treatment and condition was also introduced as a precursor to a wholly digital recording system.



Figure 4. X-ray plate of iron objects reveals form without the need for laborious mechanical cleaning.



## CONSERVATION OF THE BASILICA (CHURCH) MOSAIC

Duygu Cleere

*British Museum*

In 2003 an initial condition survey of the mosaic from the Church outside the Walls was undertaken (see *Annual Report* 2003, 31–32). The survey concluded that the current supportive backing of iron-reinforced concrete had reached the end of its useful life and could no longer ensure the future stability of the mosaic. Moreover, in some areas the deterioration of the backing was accelerating the loss of the original tessellatum layer through expansion as a result of the corrosion of the steel with resultant fracturing and delamination of the concrete substrate. Steam cleaning tests were undertaken next to assess the suitability of these techniques for removal of accumulated dirt and plant growth. The availability of suitable facing support materials was assessed and short term protective measures for securing the mosaic in its current position throughout the winter of 2003/04 were discussed with the conservation staff of the NPTC.

In the fall of 2003 the NPTC built a temporary protective structure over the mosaic and undertook a comprehensive steam cleaning treatment of the surface, using a Derotor GTV6 conservation steam-cleaning tool.

### Design of the Lifting Project

In May of 2004 the ICA conservation team met with the NPTC conservators. It was unanimously agreed that the mosaic should be lifted from its current location—a subsiding earthen platform—and that the aging reinforced concrete backing be replaced with a more acceptable alternative.

Conservation records in the NPTC archive revealed that the mosaic was first conserved in-situ after its excavation in 1902. Lacunae were filled with concrete to stabilise the eroding edges (Fig. 1), the church in which the mosaic was located was covered with a roof.

With the impending German invasion of Sevastopol during WWII, the mosaic was covered with paper and boards and buried beneath a layer of soil. The covering was later dug up and burned for fuel and the mosaic was severely damaged. At the end of the war only 30% of the original mosaic remained.

In 1952, the mosaic was lifted, conserved and displayed in the grounds of the NPTC. Reconstruction was carried out, following the accepted practice in the Soviet Union in the 1950s, using replacement tesserae to complete the design. For areas of original surface, original tesserae recovered during the excavation that accompanied the lifting process were used. For their placement, records of the design from the original 1902 excavation were utilized. For areas lost in antiquity, designs were extrapolated from the remains of the original and executed in black and white tesserae to differentiate known design from hypothetical reconstruction. The second conservation treatment commenced in 1952 and ran for twenty-six years. The mosaic was finally open to the public in 1983.



Figure 1. The mosaic in situ with 1902 concrete fills to hold lacunae in place

According to current international practice, mosaics should be presented in as close as possible to their condition on discovery. Lacunae should be filled with obviously new material and not original or replacement tesserae, to avoid any possibility of misinterpretation of new and original material. Where the locations of the lacunae are such that interpretation of the original design is difficult, monochrome outlines may be employed to give an outline continuity of the design across the missing areas. When previously conserved mosaics are re-treated, they can be updated to current standards. In the case of the Church Mosaic, however, the previous restorations should remain because the initial restoration after WWII was based on the original documentation at the time of excavation, and is therefore not speculative. Moreover, it is unclear what is original and what was reconstructed using original tesserae. The work of the mid-20<sup>th</sup> century restorers is of such exceptional quality as to be a work of art in its own right and now forms part of the mosaic's history.

### Displaying the Mosaic

The location of the mosaic—exposed to the elements in tree covered area near the Museum courtyard—was clearly unsuitable. The mosaic could not be left where it had been (from 1983 to 2004) without further, irreversible damage. The site had to be modified or the mosaic moved. Leaves and branches falling from the trees were directly responsible for deterioration of the original material and the earthen plinth on which the mosaic was displayed allowed waterborne contamination from the soil to penetrate the structure from below. Curing the problem of rising contaminants would be relatively simple, as the current backing could be replaced with an impervious polymer based material, or alternatively—if a permeable backing was used—a water proof membrane could be employed to isolate the mosaic from the ground. The problem of the trees was a harder problem: either the trees needed to be removed or a roof structure would be constructed to cover the mosaic. Both these options raised serious issues of presentation. The trees offered shade to the mosaic and so reduced differential thermal expansion while being aesthetically pleasing. A shelter, no matter how well designed, would interfere with

the view of the mosaic and mar the appearance of the courtyard area.

### Moving the Mosaic

Historically the NPTC has lifted mosaics using a surface consolidation method employing paper and fabric facing-layers applied to the surface of the tessellatum using animal or fish based glue. As this method has been proven effective and the material is readily available, this method was chosen as a surface treatment for the current conservation project.

A test revealed that the mosaic was in far more critical condition than initially thought. The degree of delamination from the substrate and fragmentation of the tessellatum layer was much higher than expected. Consolidation of the panel edges was therefore undertaken to allow each panel to be moved away from the mass. This allowed the facing to be applied down the sides of the panel, giving the tessellatum layer greater stability.

The entire mosaic was stabilized, faced, lifted, and placed in protective storage prior to the onset of the winter. The mosaic will not deteriorate while in storage as long as the condition of the packaging is monitored to ensure its ongoing effectiveness. Located in a temporary covered shed on the museum grounds, the mosaic is now in stable condition and a “breathing space” has been established, allowing careful and reasoned preparation to be made for conservation and subsequent display.



Figure 2. Initial consolidation of the surface prior to application of facing.

CONSERVATION OF THE HELLENISTIC STELAI  
Chris Cleere

Working in collaboration with the necropolis monument team (see Posamentir and Lippert in this report), the conservation team initiated a series of cleaning tests to assess the feasibility of removal of lichen growth that is currently obscuring the surface of many of the fragmented grave stelai. The lichen layer hinders identification of surface marks and results in dramatic and unsightly color variation when the broken stelai are reconstructed. The lichen colonization occurred on fragments of stelai left out of doors after excavation (the stelai and other grave monuments retaining painted decoration were either on display or in storerooms and have been the object of study since 1994 by ICA and collaborators (see *Annual Report 2001*, 48–54). Many stelai fragments had been joined since the time of their discovery in 1961, but many were not, and some had been mistakenly put together. Beginning in 1994, further joins were uncovered, but then in 2001, Richard Posamentir was able to show that many fragments of stelai and sarcophagi deposited on the grounds of the Preserve belonged with those in the storerooms. The fragments have over the

last few years been removed to covered storage rendering the lichen dormant, but still firmly attached to the stone surface. As the fragments are now stored in a stable environment that will not promote re-colonization, removal would be a permanent remedy to the problem and render the objects stable for the foreseeable future.

The fragments are currently stored in two steel sheds, constructed by ICA in 2002, in the museum garden. They originally lay on an iron grid forming the floor, the space between the iron bars filled with gravel. In 2004, they were placed on raised soft bearers, isolating them from ground moisture. The risk of condensation was reduced by improving ventilation of the previously closed space.

Following an agreement between the NPTC conservators and ICA, a number of fragments were cleaned using steam cleaning equipment. Holes were made in the broken faces with diamond core bit drills to receive reinforcing bars (Fig. 2). [Using diamond core drills has advantages over regular tungsten-tipped drill bits: the bit does not vibrate or use a hammer action, and is extremely



Figure 1. Botanical colonization is removed from a monument fragment by steam cleaning.



controllable, minimizing the risk of cracking or splitting of the stone. The core bit has the added advantage of removing a solid mass of stone that can be used for geological analysis.]

High carbon stainless steel was chosen for the reinforcing dowels. It is inert and will not corrode, and its location can be easily established using metal detecting equipment.

Both an adhesive and a pin were employed in making the joins. The choice of adhesive was an epoxy resin paste manufactured by the General company in Italy, commonly used and approved by the international conservation profession. Epoxies are not easily reversible, but their long term integrity is assured. The removal of original material, in this case, the stone core, from an object is normally avoided if at all possible. In the case of free standing, heavy stone objects, however, reinforcement of the joints is necessary to provide a secondary fixing in the unlikely case that the adhesive fails.

The removal of the botanical colonization of the fragment surfaces soon became an issue. Steam cleaning is effective and it poses few risks to the stone. As it involves only the application of water to the surface, the risk of chemical modification, or the retention of potentially harmful residues within the structure of the stone is eliminated.

Lichens, however, are tenacious organisms and can remain dormant but still living for extended periods without any obvious source of water, relying on the absorption of moisture directly from

the atmosphere. Lichens anchor themselves to stone surfaces by the means of roots that penetrate the porous surface. It is the increase in volume of these root systems as the plant grows that results in pulverization of the stone surface, and it was also this strong attachment that reduced the effectiveness of the steam cleaning treatment.

The use of biocides to assist the removal of biological colonization is established practice in the west, but not yet in eastern Europe. Many advances in chemical formulation have occurred in recent years and much research has been undertaken into its application to the field of conservation and the resulting long-term ramifications. The pertinent literature on the subject is not available to conservators in Ukraine and, therefore, the NPTC conservators are, unfortunately, unaware of the advances in this field of conservation. While the preparation of stones for joining proceeded rapidly in 2004, the tedious job of cleaning with steam has been postponed until the issue of biocides can be resolved to the satisfaction of all involved.

The stelai conservation although limited in scope in its initial year was highly successful. Conservation of stone object by professional conservators has not been undertaken at the NPTC for many years. The NPTC conservators were interested in the project design, techniques, equipment and materials employed. After much discussion and sharing of information, the conservators have adopted the storage system and handling techniques designed for the stelai project for their own work with stone objects.



Figure 2. Surfaces of a monument fragment are cleaned in preparation for joining together.





Figure 3. Points for locating reinforcing rods are determined.



Figure 4. Fragment orientation is determined prior to joining.



Figure 5. Stelai fragments ready for joining.

## CHERSONESOS MUSEUM: SURVEY OF STORAGE AND DISPLAY FACILITIES

Robert Howell  
*Museum of London*

In spring 2004, Museum of London Specialist Services conducted a survey of the artifact collection held at the NPTC. The Museum of London was asked to undertake this project in part, at least, because of the similarities of the collections held by its London Archaeological Archive and Research Centre (LAARC) to the collection held by the NPTC.

The artifact collection at Chersonesos is a remarkably rich and varied resource that could be studied and enjoyed by everyone from international archaeological specialists to local children. Due to the nature of the storage spaces and the packaging and the scattering of these spaces across the site, however, the use of the stored collection currently has to be restricted to academic researchers who ask for specific items to be brought to them. As Ukraine becomes more internationally accessible, so the collection could become more widely known. The facilities for its use need to keep pace with these changes. Improved access to the collections is an important consideration for NPTC as it seeks international support for nomination as a World Heritage site.

The aims of our work at Chersonesos were:

- To conduct a survey of the condition of all archaeological objects and associated records in the storerooms and archives.
- To conduct a preliminary “snap-shot” assessment of the environmental conditions experienced by the collection on the site.
- To assess the three dimensional space currently taken up by the collection across all storage areas.
- To observe and discuss the experiences of the use and conservation of the collection with staff at the site.
- To analyze the data collected and observations made to provide short and long term recommendations in a report format.
- To ensure that any recommendations made are:

*holistic*—consider their impact on the whole collection rather than one part of it;  
*practical*—realistically achievable and possible to maintain by the staff on site with available assistance and support;  
*sustainable*—can be implemented using local resources and suppliers wherever possible.

- To provide ongoing support to assist with implementing the recommendations (the nature of which would be discussed and agreed at a future date).

### Methodology

The team visited all the storerooms on the NPTC and conducted a visual assessment of the general stability of objects and their packaging and environmental conditions throughout. We chose to survey a representative selection of the collection, by examining approximately 10% of the



Figure 1. Team members take a detailed inventory of stored objects.

assemblage, that is, every tenth object. However, if an unusual problem was noted with a particular object, or if a particular section of the collection would otherwise have been missed, this was also included in the survey (Fig. 1). Temperature and relative humidity spot-readings were taken during the day and in a representative selection of storerooms, over a 24 hour period. Storage area and volume was also measured within the existing object storerooms to facilitate the planning of future storage space.

### Storerooms

The storerooms are found in a variety of outbuildings on the NPTC, with two additional spaces for objects in the main museum building and secure storage cupboards for coins from the collection, in the “Fondi” (storeroom) offices.

Most of the outbuilding storerooms were built in the late 19<sup>th</sup>–early 20<sup>th</sup> century, and were not intended for archaeological objects. Doorways are narrow, the rooms are relatively small and there are entrance steps that make it difficult to move large and heavy items such as amphorae, stonework, anchors, etc. within and between buildings without considerable risk to staff and objects. The small proportions of the storage rooms also mean that there is insufficient space for large objects to be stored on shelves without them projecting into the corridors or room space. It also means that some of the large stones have to be stacked on top of and against each other to fit them into the space available. Many of these are stored on the floor because of insufficient space. In the event of a disaster, such as a flood or fire, it would be difficult to remove the objects quickly and easily to save them.



Figure 2. Storage areas are overcrowded due to space limitations.

Several of the storerooms are at basement level and can flood easily if the fabric of the building is poorly maintained. The largest basement storage area had recently flooded and visitors can still feel the dampness of this space when they enter. It is important that the roofs and fabric of the storerooms are maintained as water damage in the storerooms could be catastrophic to the collection. Leaks and flooding can damage objects beyond repair, encourage mold growth, and cause loss of identification information in these storerooms.

The majority of the shelving units used throughout the storerooms is constructed of timber. Some of this is unplanned and in poor condition. Harmful acidic vapors released by wood can affect all metals and most organic objects. The timber shelving does not always give adequate support for the imposed load, and some of it is dangerously propped against walls to hold it upright (Fig. 2). Some of it has been significantly damaged by wood worm activity. Wooden shelving tends to collect dust, is difficult to clean, absorbs moisture, and it is not as strong as some metal shelving. Where metal shelving has been used in the storerooms, it tends to be fixed units of metal struts, sometimes with plywood shelves rather than an adjustable, all-metal shelving system.

In a number of storerooms large pots are stored on shelves that are often too narrow or high for the safety of either staff or objects (Fig. 3). Large pieces of stone are generally stacked on the floor or on ledges, which could lead to condensation and mold and other micro-floral growth. It is difficult to thoroughly clean storerooms that contain these types of objects or to check for leaks and pest



Figure 3. Shelving is too shallow to safely accommodate large objects.



problems, as the objects are often too large or heavy to move.

Some items are currently stored on examination tables in storerooms, because they are awaiting exhibition or because there is insufficient space for them on the shelves (Fig. 4). This is not desirable for long periods of time as it makes it difficult to retrieve objects safely from the shelves without holding them or putting them on the floor, or without moving the items on the tables.

### Packaging

Although most of the smaller objects are boxed, most packaging within the boxes is insufficient and inappropriate for the long term care of the collection (Fig. 5). Assessment of the number of objects and estimates of the current storage space also demonstrated that space could be used much more efficiently if changes are made to the packaging system.

Many of the smaller objects are individually boxed; the boxes are then balanced in a stack on top of each other and sometimes are stacked on other objects because of lack of space (Fig. 3). This makes access to individual items difficult without rearranging the stack, adding to the risk of dropping boxes and damaging objects. In some storerooms there are no examination tables to rest boxes on temporarily. Many of the boxes are made from non-archival, flimsy cardboard, which is not robust enough to withstand long term storage.

### Environmental conditions

#### *Temperature and relative humidity*

The temperature and so relative humidity (RH) of the air can cause physical and chemical change to objects. A temperature range of 16–24° C is often recommended for museum displays for visitor comfort, although they can be lower in storage, provided that the RH does not then become unacceptably high. Temperature stability is crucial, because of its influence on RH levels. RH cycles should usually be within a band of 40–70% with no more than 10% RH fluctuation within 24 hours.

Some parts of a collection will be more sensitive to temperature and relative humidity than others, for example ironwork needs to be stored in a desiccated environment to reduce the corrosion processes that can lead to eventual disintegration.

Temperature and relative humidity are currently measured in the storerooms using old manual thermometer/hygrometers. There is no continuous monitoring of the environmental conditions, so it is not possible to track changes over short periods of time or easily analyze the data and look at trends.

#### *Housekeeping and pest management*

Staff stated that basic cleaning of the floor takes place in the office and storage areas, approximately every two weeks. However, there was thick dirt



Figure 4. Lack of adequate shelf space means some objects are stored on work tables, hampering access and work space.



and dust in many of the storerooms on shelving, boxes and objects in the storerooms. It is advisable in addition to the regular basic cleaning, that all the storerooms are “deep” cleaned once a year to ensure that all areas that are normally not reached, are kept clean, for example beneath and behind storage racking, behind stored boxes etc.

Currently there is no pest management program in the storerooms or the museum to alert staff to the early signs of infestation and to deal quickly with this. There was considerable evidence of wood worm both inactive and active in several storerooms. This level of wood worm activity has made a large quantity of the existing shelving unstable. It also means that if wooden objects are recovered through excavation and collected in the future, they could not be stored in some of the existing storerooms without risk of damage.

#### *Access and security*

For ethical reasons, it may be considered more appropriate to store human bones together in one place and to have a specific policy of whom may handle them and how they are used and examined (Fig. 6).

It would be easier for staff and specialists in organic materials to find and access this collection if it were kept either together in one central storage area. No material should be held in storage by individual researchers or in offices as this reduces

the accessibility to it for other users and makes it difficult for staff and conservators to check its condition and monitor its security.

#### **Document archive and library**

A separate study has been prepared discussing storage issues in the document archive, and this area of the collection is already benefiting from the work of the Megarica project, leading to greater accessibility and physical protection as material is re-boxed, sleeved, and scanned.

Introduction of an environmental monitoring system to the NPTC should incorporate the document archive storage rooms and the library as well as the object storerooms. Likewise a pest management scheme should also operate in these areas. Housekeeping arrangements should be the same; food and drink and animals should be kept out of the storage and study areas in the library and document archive to avoid attracting pests to areas where historic material is kept. Conservation treatment records are an important part of the object collection records, and these forms are still filled out on non-archival paper, which is vulnerable to decay. A record system that uses more durable card or paper should be developed alongside the digital record as a safeguard.

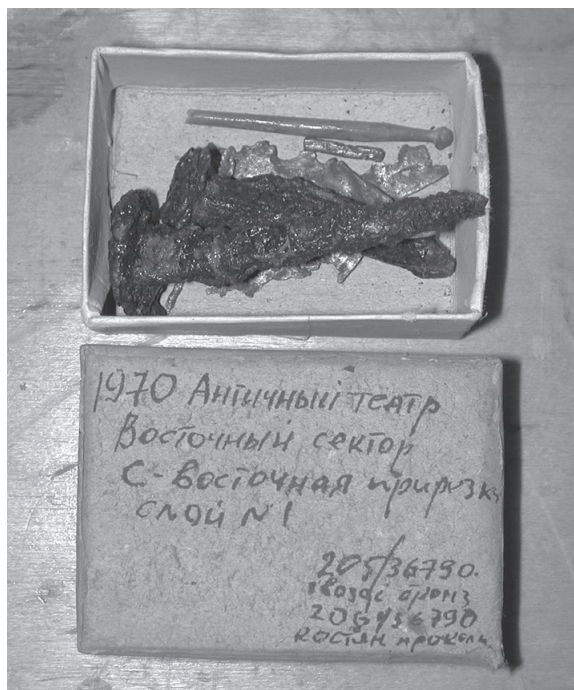
The library is very short of space, with books and papers stored on top of the shelved books, next to the ceiling. The gaps between the floorboards in the library allow dirt and fumes to penetrate into the main library space, which is detrimental to the collection. The wooden plank floor also soaks up moisture when the floor is mopped to clean it, and takes some time to evaporate. This can increase the RH in the storeroom significantly and cause fluctuations of RH as the floor dries out and then is wetted again during the next cleaning session.

The book collection could also benefit from being categorized into a working reference collection and a rare book collection with different respective conditions of access.

#### **Display**

Although the projects main aim was to assess the storage facilities, some consideration has been given to display conditions, as objects in the museum displays also need care and conservation support as part of the collection.

The displays are housed in the galleries on the upper floor of the main building and the Ancient



**Figure 5. Current storage materials lack physical protection and archival environment.**

Hall. Both are historic buildings in need of structural repair and refurbishment.

The galleries in both buildings have experienced significant leaks and floods due to age and poor maintenance. Before any new displays are planned for the galleries, the condition of the buildings and their service pipes should be checked and repaired where necessary. This should take place annually, or more frequently as the need arises. It is difficult to provide an appropriate environment for fragile objects on display unless the buildings are sound, and there is little point in investing time and money conserving these objects for display, only to put them at risk.

Most objects are in cases, which gives them some physical protection, but the displays are approximately 20 years old, and therefore incorporate display materials characteristic of that period. The cases are glass and wood framed wall-cases and table-top cabinets with painted textile on chipboard backing.

A number of objects have been glued to their mounts. Obviously this is inadvisable as it is often difficult to remove the object without damage and is difficult to check its condition on all sides. There is no monitoring of temperature and relative humidity in the galleries. Any program of monitoring should include the display areas. If light levels from daylight and gallery lighting falling against organic objects in the display areas are found to be too high, it may be necessary to use adjustable blinds over the windows near these areas to reduce the effects of light.



**Figure 6. Storage methods and access to human remains raise ethical considerations.**

The floors are mopped regularly but the object displays appear to be cleaned only when objects are removed. The insides of the cases should be cleaned annually by dusting. This work would need to be done by conservators or Fondi staff members, who understand the fragility of the objects on display and how to handle them.

### **Summary of recommendations**

- The NPTC should consider the establishment of a purpose built building to accommodate the stored artifact, library and document archive collections, the conservation laboratories and a study area for visitors. Plans for a new facility should include shelving and storage cabinet solutions suited to the proportions of the objects and their use.
- Purpose built weatherproof storage facilities (rooms with appropriate access, pallets, pallet trucks and shelving) are needed for the storage of the many large objects in the collection, such as large mosaic pieces, stones, anchors and large pots.
- It is essential that while the NPTC continues to use its current storage and museum buildings, that the building fabric, the pipes and boiler systems should be regularly checked, at least annually, for leaks and structural damage. If any problems are found they should be promptly dealt with to avoid damage to the collection.
- An environmental monitoring system should be introduced to enable a program of long-term, continuous monitoring of temperature and relative humidity to begin. This system should include all the storerooms, the document archive and library and the galleries. Training should also be included for appropriate staff in the use of the software, monitors and interpretation of the results.
- A disaster plan should be put in place to organise facilities in advance and help staff cope with fire, flood, theft etc.
- Any new storage facilities should be above ground. In the meantime, given the tendency for existing basement storerooms to flood it is recommended that a water detection system is installed in these storerooms, wired into an alarm system.

- A pest monitoring program should be introduced to all storage and display areas, including the library and document archive and procedures should be set up to deal with any infestations. This should include the appropriate training for the relevant staff.
- A “deep” clean of the storage and display areas should be organized on an annual basis, in addition to the basic day-to-day cleaning of these areas.
- Begin a program of replacing timber shelving and storage units with a consistent, adjustable all-metal shelving system with a baked enamel paint finish, appropriate for the size and types of objects. Gradually replace all shelving with consistent all-metal shelving.
- Provide storage space and shelving/cupboards specifically for packaging materials, and keep them off the floor and away from walls.
- In the new conservation laboratories/workspace, provide lockable storage cupboards for temporary storage of objects due for conservation.
- Repack the collection using a packaging system which uses only archival materials and allows “visible” packing e.g. each object bagged in perforated polyethylene within boxes, and multiple stacked bags per box to make more efficient use of shelf space and to reduce handling.
- Store ironwork in sealed, archival plastic boxes and introduce bagged, non-indicating silica gel with attached indicator strips (this requires an available oven for regeneration of the silica gel). Discard old cobalt chloride indicating silica gel safely. Introduce a six monthly or annual program for changing the silica gel.
- Introduce Tyvek (breathable polyethylene) dust covers or lidded crates for larger objects in open storage and archival foam lining for shelving. When new storage areas are planned for large objects, racking and pallets of appropriate proportions for them should be included in the plans so that they are not stored on the floor or on ledges.
- Store human remains in lidded boxes for conservation and ethical reasons. In a future, more accessible storage facility, consideration could be given to storing this material, together with a specific policy on handling, so that access to it is more controlled than to other material.
- All the environmental material, such as eggshell and animal bone, could be stored in one place to make it easier to locate, or grouped together within respective parts of the collection in a future storage facility. Material currently stored by individual researchers should be retrieved and brought back into the main collection.
- In the long term, consider bringing the Fondi and document archive staff together into one department and office area to help coordinate preventive care of all of the stored collections. Ensure that new measures in collections care such as continuous environmental monitoring and housekeeping procedures are consistent across the artifact, book and document collections both for efficiency and because some measures such as pest management are only effective within a building, if all areas of it are covered.
- While awaiting longer term introduction of new storage arrangements, a library floor surface over the wooden floor-boards, similar to that in the document archive, would improve the effects of wet-cleaning and seal the book collection from basement fumes.
- The library collection should be separated into a working reference collection and a rare book collection with differing appropriate conditions of access and environmental conditions. This may not be possible until more space is found for the library collection, for example as a result of repacking of the artifact collections, or through a new storage facility. This could have a supervised reference space for the rare book collection and the outsized document archive material.
- Use a light (lux and UV) meter to check the light levels falling on organic objects on display. Consider introducing adjustable blinds to relevant windows if daylight levels are too high in these areas.
- Wherever possible, in new displays, stable display-case materials should be used; that is, materials that do not give off gasses that harm sensitive objects.

## Conclusions

The collection at the NPTC is substantial, rich and unique, representing over one hundred years of excavation, at a site permanently occupied for almost one millennium. Though now deteriorating as a result of a lack of funding over a number of years, the collection still exists and remains accessible, due wholly to the dedication of the staff responsible for its care. The Fondi staff is well motivated and has a good knowledge of their profession. With the help of further professional

training from international experts and access to the equipment and materials required, they are well equipped to ensure the future of the collection.

The loss of even a small part of the NPTC collection would be tragic, and it is hoped that the initial condition survey undertaken in 2004 and the recommendations that resulted from it will form the first step in a process that guarantees its continued availability for future generations.



R. Posamentir

*German Archaeological Institute, Istanbul*

C. Lippert

*Architectural Historian, Dresden*

Work on the gravestones and related materials from the early Hellenistic necropolis of Chersonesos in summer 2004 was mostly concentrated on architectural elements in order to identify and reassemble different structures. Comparable to the stelai, the preservation of paint on these architectural elements is absolutely outstanding. Work consisted in the main part of accurate 1:5 drawings of each fragment, including careful documentation of all sides, precise recording of tool marks or constructional incisions, and comprehensive detailed photography.

This research was carried out by a team of archaeologically-experienced German architects (Dipl. Ing. C. Lippert, University of Dresden, Germany; head of the team and former participant in the excavations of Pergamon; supported by I. Engelmann and A. Schanze, both University of Dresden, Germany) and advised by the archaeologist in charge of the publication of the gravestones, Dr. R. Posamentir (German Archaeological Institute Istanbul, Turkey). During some six weeks approximately a third of the material was recorded, with the remaining pieces left for the next season, when documentation work should be finished.

The main reason for this effort lies in the fact that stelai, by being reassembled during previous campaigns, eloquently proved that the complete

inventory of a 4th–3rd century BC necropolis was reused as building material in the Tower of Zeno. It would thus seem only logical that most of the architectural elements found in the same spot belong together and originally formed part of some impressive and representative grave monuments.

While reassembling stelai proved to be easy due to the fact that exact knowledge of their original appearance was at hand, reconstruction of the mentioned monuments turns out to be much more difficult and even more interesting as they obviously show peculiar and up-to-now unknown features. The only way to find out more about these constructions doubtlessly requires more intensive work with these fragments, i.e. precise documentation of all details, surfaces and materials. Results of this work are meant to be published in Volume II of the forthcoming publication, *Polychrome Grave Monuments from the Early Hellenistic Necropolis of Chersonesos Taurike*.

Another important part of summer campaign 2004 was dedicated to the preparation of the stelai publication. This volume will deal with gravestones, bases, and smaller elements, like the well known anthropomorphic objects. Archival research, as well as the field survey, focused mainly on ascertaining where and in which combinations the gravestones and anthropomorphic objects were placed originally. For this reason attempts were

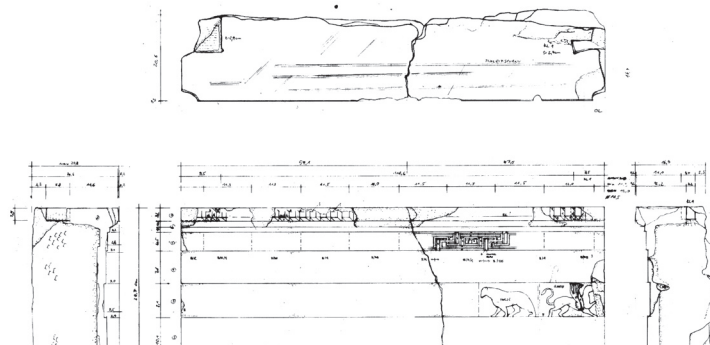


Figure 1. Sarcophagus front piece, decorated with meander and frieze and animal depictions.

made—together with local archaeologists—to relocate all known cemeteries and burials around Chersonesos, and to gather all materials, plans, or reports, many of which are kept in the archives of the local museum.

The search for comparable material was again extended to other sites along the northern Black Sea shore, including Olbia, Berezan (or Kerkinitis)

in the north and Pantikapaion, Nymphaion, Myrmekion (or Tyritake) in the east. Gravestones and anthropomorphic objects kept in the storage rooms of Kertch offer especially important and interesting parallels; in the north similar features are rather scarce. Preparation work for Volume I is now complete and should lead to the publication in 2006.



Figure 2. Stelai and stelai base elements at various locations in the Preserve.



Jessica Trelogan  
*ICA*

A pilot project was begun in 2003 to create a GIS (Geographic Information System)-based recording plan that would facilitate the systematic assessment and long-term management of conservation conditions at Chersonesos. After two seasons, it is now nearly fully functional and is showing great promise as a tool for Chersonesos and as a potential model for conservation at similar complex sites.

### Base Mapping

The first and most time-consuming step for developing a condition recording system has been creating an adequate digital mapping base for the GIS. As has been pointed out in previous Annual Report contributions by the author, this is especially difficult at Chersonesos where existing paper maps are either unavailable or inadequate, and where security issues still preclude the use of GPS (Global Positioning System). Relatively time- and labor-intensive total station survey has thus been the best option for obtaining an accurate mapping base, and it was a major part of this season's campaign. During a five-week season in

May and June, a team of six surveyors continued the survey while continuing to refine and test the conservation condition recording system.

### Photographic Documentation

A substantial amount of mapping work was completed this season, but not quite as much as was planned due to a number of unexpected tasks that required immediate attention. The most time-consuming of these was the collection of a set of pre-conservation photographs for a large portion of the city's Northern Region (see Trelogan, *Annual Report 2003*, p. 35–36 for methodology). A private conservation company, Krym Restauratsia, had been contracted by the Preserve to complete this conservation work in Summer–Fall 2004, so it was a high priority to document the pre-conservation condition of all the structures to be conserved (Fig. 1). Although this took a great deal of time away from the total station survey, it proved an excellent opportunity to field-test the methods developed in 2003 for creating a detailed, stone-for-stone record of the structures being conserved—an integral



Figure 1. Lesley Kadish (center) takes pre-conservation photographs in the northern region while Fred Van de Walle and Andy Holbrook conduct site condition survey.

part of the recording system. This is proving to be an highly useful set of documentation, easily accessed by conservators through the GIS software in the field. On at least one occasion this season, these detailed photographs were used to help conservators properly reconstruct a portion of a wall that had collapsed (Fig. 2).

### Aerial Photography

Fortunately, another of the unexpected tasks was one that will eventually improve the quality of the mapping base and save an enormous amount of time and labor for completing it as planned by next season. Near the end of this year's season we were given access to a recent vertical aerial photo, at a scale of approximately 1:100, that covered the entire ancient city. The photograph—acquired by a local cartographic company in spring of 2004—is recent and detailed enough to map not only individual archaeological structures, but also all of the minor ephemeral footpaths and vegetation cover, details that would be virtually impossible to map without extensive fieldwork (Fig. 3). During the last week of the season, we were given permission to scan a large print of the photograph and had just enough time to collect a set of ground control points that will be used to provide geometric control for georeferencing the photograph. It will now be possible to digitize the remaining unmapped portions of the site directly from the photograph, leaving a relatively small amount of field validation as the last phase of the fieldwork required to complete the map in 2005.

### Conservation Condition Recording

One of the fundamental first steps in developing a successful and sustainable conservation plan is getting a comprehensive overview of the site's current conditions and the types and extent of destructive forces acting on it. This is a particularly difficult challenge at a site like Chersonesos, which contains over 160,000 m<sup>2</sup> of exposed structures in the city center alone (not even taking into account the sites dispersed throughout the chora). GIS has proved an extremely useful tool for managing, manipulating, and accessing information relating to the site's overall condition.

While work on the base map continued, we were also refining the GIS and conservation recording methods for a general site condition survey carried out by Chris Cleere, et al. (see "Site Conservation Survey," page 43). For the general condition survey, conducted during a two-week campaign in June, a 10 meter reference grid was established over the site, following the general orientation of the ancient city grid. For each 10 meter square within the reference grid, information was gathered relating to the general condition of structures within that square (see Trelogan, *Annual Report 2003*, p. 36). The results of the survey were entered into a database that links through to the GIS via the reference grid. Over 900 ten-meter squares were surveyed, providing an overview of the site's general conditions. With these data now accessible through the GIS, the results are easy to visualize and assess, giving the conservators a ready means of



Figure 2. Jonathan Kemp refers to a detailed wall-face photograph to help reconstruct a section of collapsed wall.



prioritizing areas for immediate conservation and facilitating the development of the conservation and management plan (Fig. 4).

### Excavation Recording

In addition to providing support for conservation, the GIS team has been developing recording methods for the joint ICA/NPTC excavations. The use of GIS-based excavation recording—an experiment begun in 2002 with the team from Lecce University—was re-visited this season at the excavation in the southern region of the city. The use of total station mapping was continued for finds and standing architecture, while a more elaborate system was adopted for planning individual contexts, with a concentration on a seamless integration between the excavation database and mapping data via the GIS.

Several experiments were conducted to test and refine our recording methods in order to speed up fieldwork and to expand the amount and scope of information recorded. For example, the use of near-vertical photography was investigated as an alternative to time-consuming paper-based planning for excavated contexts. The photographs—geo-referenced via control points collected by the total station operator and the contents digitized directly on-screen—in many cases resulted in much more accurate and detailed plans than any 1:20 or 1:50 scale drawing could provide, with the added benefit of being more quickly produced. They proved extremely useful for more complicated contexts such as roof tile falls, and disarticulated skeletons.



Figure 3. Detail from an aerial photograph acquired in spring 2004. Visible here are the ancient theater (bottom left), the main museum buildings, including the construction site of the Packard Laboratory (center left), the church of St. Volodymyr (center right), and several ancient city blocks (top).

### Upgrade of GIS Software

An upgrade in the GIS software used at Chersonesos from ESRI's ArcView 3.2 to ArcGIS 8.x software represents another significant part of the work carried out this year. The new software platform is an enormous improvement over the previous version, with increased speed and stability, enhanced user interface, vastly improved graphical display and more seamless connectivity with external databases. A large amount of time and effort leading up to and during the summer season was invested in transferring existing data to the new platform, as well as to learning the capabilities of the new software in order to make the most of its advantages and to train users at the preserve.

### Training of Students and NPTC Staff

Informal workshops and presentations in the use of GIS software and total station mapping methods were carried out throughout the season. Viktor Samoilenko continued working closely with the GIS and survey team and is now proficient in total station mapping the use of the GIS software both for conservation and excavation recording. Conservators from the ICA team and NPTC staff were also trained to use the photographic recording system to ensure that all structures are adequately documented before any conservation takes place outside of ICA's season in Ukraine.



Figure 4. Sample of conservation conditions survey results. This map displays scores recorded for the condition of wall tops in each 10 meter square.



Taissa Bushnell  
*Director, Pidtrymka Chersonesu*

Pidtrymka Chersonesu (PC), a non-profit organization, was founded in 2002 by the Institute of Classical Archaeology and is based in Sevastopol, Crimea. PC made significant strides in 2004 towards two of ICA’s major goals at Chersonesos: the construction of the Packard Laboratory building and the nomination of Chersonesos to the UNESCO World Heritage List. Both projects aim at assisting the National Preserve of Tauric Chersonesos (NPTC) in becoming a leading heritage site not only in Sevastopol, which is rapidly growing into a regional tourist center in southwestern Crimea, but also in Ukraine, which at the end of 2004 made its own mark on the world stage. It is especially timely to recall that it was at Chersonesos that democracy made its first appearance in the territory of what is today Ukraine. A successful nomination to the World Heritage List will highlight this historical parallel as Ukraine works towards the rebirth of democracy in 2005.

### **The Packard Laboratory**

The Preserve’s first modern collections storage and research facility, made possible by the Packard Humanities Institute, neared completion at the end of 2004 (Fig. 1). The Laboratory is built on the site of a 19th century monastic bathhouse, a part of which was being used by the Preserve for storage. Because the poor condition of the building precluded its re-use, the decision was made for complete demolition and construction of a new structure on the footprint of the old. Today the new building contains a floor below ground (and a half-floor below that) to be used for the storage of archaeological finds. These levels are linked by elevator to the ground floor. The ground floor with a gallery above will be used for the analysis of material from sites of Preserve and ICA’s joint excavations. In the summer of 2005, archaeologists, ceramicists, osteologists, archaeozoologists, paleobotanists, physical anthropologists, conservators, and others working



Figure 1. The Packard Laboratory, December 2004



on joint projects will have a comfortable, shared facility. The laboratory will have ample computer space and internet access. The twofold problem of limited work space and limited storage space (for temporary summer finds storage and secure storage of Chersonesos' unique Hellenistic grave stelai) will be alleviated by the Packard Laboratory. Furthermore, the improved open storage of the stelai and other artifacts will enable easy access for scholars studying the objects as well as for possible guided tours. The installation of reliable heating and air conditioning will enable the building to be used throughout the year.

Upon completion of construction in 2005, the building will be furnished and environmental monitoring equipment installed for the safe storage of archaeological material. Consultation, in May 2004, with experts on museum collections care (from the Museum of London) will ensure purchase of the proper equipment and supplies. Training of staff in correct procedures should take place in 2005.

The archaeological site uncovered during the laboratory's excavation, including remains from the three principal periods of the city (Greek colonial, Roman, and medieval) will be conserved for display. The design of the modern building has accommodated the historic site by including windows for viewing the archaeological structures by the public from outside as well as for closer study inside. The various possibilities of presenting the archaeological story to the visiting public at this site are exemplary, as nowhere else at the Preserve have such efforts been taken to attempt to reconcile the needs of the modern museum with the archaeological resources. This reconciling of the exigencies of public access with the expanding museum facilities and the imperative of monument preservation will serve as an model of the extraordinary efforts needed to preserve the cultural heritage of the Preserve. An example of this effort is Wall 1, which runs parallel to the Packard Laboratory and needed to be reburied after its excavation in 2003. Its path will be traced on the surface with stone slabs indicating



**Figure 2. Chersonesos, June 2004. (Left to right) Larissa Sedikova, NPTC Deputy Director for Conservation; Tetiana Izhevskaya, head of the Department for Cultural and Humanitarian Cooperation and assistant head of the Ukrainian National Commission for UNESCO; and Dr. Henry Cleere, honorary professor at the Institute of Archaeology, University College London.**

its existence underground (a detailed account and plan of the archaeological excavation at this site appeared in ICA's *Annual Report 2003*).

The Packard Laboratory, in conjunction with the newly refurbished conservation labs at the Preserve, will embody a holistic collections-care approach to archaeological material. This coincides with a desire to make Chersonesos a regional conservation center for southern Ukraine, as expressed by the Preserve, ICA, and the Department for the Preservation of Cultural Heritage in Kyiv (the office within the Ministry of Culture and Arts directly responsible for Chersonesos). The Laboratory, as currently planned, will also serve as a prototype for the proper storage of finds for the other storage areas located within the Preserve.

### **World Heritage Nomination**

As part of its mandate, PC acts as an advisory body to the management of the Preserve in the protection of its cultural heritage. Over the past two years PC has been involved in assisting the Preserve and the Ukrainian government in efforts to nominate Chersonesos to the UNESCO World Heritage List. Dr. Henry Cleere, honorary professor at the Institute of Archaeology, University College London, and former World Heritage Coordinator at ICOMOS (International Council for Monuments and Sites), has undertaken the development of a management plan for the ancient city of Chersonesos. Not only is the plan one of the key requirements for nomination, but also it is a necessary step for the future well-being of the Preserve. Dr. Cleere's experience and expertise in the sphere of archaeological heritage management have had a great impact on the Preserve. For example, his insistence that site management of the ancient land plots in the chora be included in the same planning mechanisms as the ancient city has resulted in a much closer cooperation between the conservators working in the chora and those working in the ancient city. In essence, the uniqueness of ancient Chersonesos lies in the

interrelationship between the city and chora. It is this quality which merits the "outstanding universal value" worthy of World Heritage inscription.

In view of the imperative to conserve the extraordinary archaeological resource of the ancient chora, one of ICA's goals in 2004 was to begin formal steps toward the creation of an archaeological park in the chora. Specifically, this area includes numerous ancient farmhouses—the earliest phases of which date to the 4<sup>th</sup> century BC—documenting more than a thousand years of rural life. Dr. Cleere will be assisted by the author in writing the management plan for the ancient city, while Giora Solar, architectural conservator and current Treasurer General of ICOMOS, will develop plans for the archaeological park (with ICA's Asele Surina serving as coordinator). Both teams will be working with each other (as well as with Preserve management and Sevastopol officials) since similar approaches to conservation, visitor management, and presentation are needed in the city as well as the chora.

In February 2004 Asele Surina and the author met with Yuri Bohutsky, the Minister of Culture and Arts of Ukraine, Leonid Novokhatko, Vice Minister, and Leonid Kucheruk and Evnika Linyova of the Department for the Preservation of Cultural Heritage to coordinate plans for the creation of the archaeological park. In June 2004, Tetiana Izhevskaya, head of the Department for Cultural and Humanitarian Cooperation and assistant head of the Ukrainian National Commission for UNESCO, travelled to Chersonesos for the first meeting of the working group for the archaeological park and learned more about some of the management issues facing the Preserve from Dr. Larissa Sedikova, NPTC Deputy Director for Conservation, and Dr. Cleere (Fig. 2). A visit to Leonid Zhunko, Mayor of Sevastopol, in November by Dr. Joseph Carter, former US Ambassador to Ukraine William Green Miller, Mrs. Suzanne Miller, and the author was especially enlightening as we learned how

Chersonesos fits into the context of the city's future development, namely as one of the major heritage attractions of Sevastopol. The city's twenty-five year master plan focuses on tourism as its single most important source of income, and plans for the improvement of infrastructure, including the expansion of Belbek Airport in Sevastopol, will make Chersonesos more easily accessible to visitors.

A successful nomination of Chersonesos to the World Heritage List would result in significant benefits to the Preserve. It would raise the international prestige of Chersonesos and attract more tourist revenue both for the site and the city of Sevastopol, which is currently transforming itself from a military-industrial economy to a center for Crimean tourism. The UNESCO stamp would place Chersonesos in its rightful location among the world's outstanding cultural heritage sites. The nomination process, whether or not immediately successful, will result in new standards of conservation and visitor management practices, to the ultimate benefit of Chersonesos.



Figure 3. Friends of Chersonesos meet at Kyiv's Independence Square in December. (Left to right) Taissa Bushnell, ICA; Neal Ascherson, distinguished journalist and author of *The Black Sea*; former US Ambassador to Ukraine William Green Miller; Mrs. Suzanne Miller.



Alberto Prieto  
*ICA*

The year 2004 saw decisive advances in the preparations for the first publication on the Metaponto field survey, which describes the methods and results of two decades of activity between the Bradano and Basento Rivers (1981–2001). In the first half of the year the visual documentation (graphic illustrations and photographs) for all artifacts was completed at Metaponto by Cesare Raho, Chris Williams, and Valerie Woelfel. Several more contributions to the volume were also completed, including the chapters on Greek terracotta votive objects, Greek and Roman cooking ware, Greek and Roman transport amphorae, Roman grey-ware pottery, and Roman and medieval ceramics.

Meanwhile, in Austin, the GIS-based statistical and spatial analyses that will be central to the volume's originality and importance were initiated by the author, Prof. Carter, and Dr. Peter H. Dana, an expert in GIS, GPS, and spatial

analysis in the Department of Geography at UT. Using parameters set by Prieto and Prof. Carter, for example, Dr. Dana developed an algorithm that sorts the mass of survey sites into distinct groups according to the percentages of the various artifact classes present in their assemblages (black-gloss pottery, coarse wares, and so on). Since the artifacts present at a site are believed to be strongly associated with its function/s—for example, terracotta votive objects are more likely to be associated with farmhouses or sanctuaries than with tombs—we expect that this algorithm will help us identify some of the many sites that cannot be positively identified from the available data alone (primarily the observations made in the field, such as the size of the site, uncollected artifacts, and land use). Greater confidence in the recognition of site types will translate directly into more accurate and meaningful reconstructions of ancient land use and settlement preferences through time.



Figure 1. Visit to Site 300, the remains of a medieval fortified settlement overlooking the Venella stream valley, known as Pietra San Giovanni.

Fieldwork at Metaponto was suspended in 2004 so that all energies could be focused on the publication. (Survey activity will resume at both Metaponto and Crotona in 2005.) By the end of the summer edited drafts of the majority of the chapters were ready, along with preliminary results from the statistical and spatial analyses of the patterns of settlement in the colonial period. Prof. Carter and Prieto decided to capitalize on the momentum of the assembled ideas by organizing a small seminar/round table in the chora of Metaponto, hosted over the course of four days (Sept. 29–Oct. 2) at ICA's sister institution in Basilicata, the Centro di Agroarcheologia at Pantanello.

The primary motivation for the seminar was to assemble all of the many contributors from around the world so that they could consider the survey data and methods as a group, exchange ideas in person, and therefore help guide the direction and progress of the volume as a whole at a relatively early stage. Besides Prieto and Prof. Carter, the participants were Gianna Ayala (Sheffield University, prehistoric ceramics), Rebecca Ammerman (Colgate University, terracotta objects), Peter Dana (UT, GIS and spatial analysis), Cesare D'Annibale (Parks

Canada, lithics and survey methods), Smadar Gabrieli (Sydney University, Greek/Roman cooking ware), Erminia Lapadula (Roman and medieval ceramics), Cesare Raho (visual documentation), Marsha Robbins (Southampton University, Greek/Roman transport amphorae), and Eloisa Vittoria (black-gloss pottery, Greek coarse ware, Roman grey ware).

Additionally, a group of seasoned professional archaeologists, all experts in field survey in Mediterranean lands, was present to provide advice and criticism on individual contributions, larger questions of analytical method, and the presentation of information and ideas, from an external perspective. These distinguished guests were Prof. John Bintliff (University of Leiden, Boeotia Survey), Prof. Lin Foxhall (University of Leicester, Bova Marina Survey), and Dr. John Robb (Cambridge University, Bova Marina Survey). All contributors and panelists were sent copies of the manuscript one month before the seminar began, so that they could read and evaluate the contents in advance.

The first day was dedicated to familiarizing the panelists and the contributors with all aspects of the survey project: the territory, the sites, and the artifacts. Prieto and D'Annibale arranged visits to selected sites (Fig. 1) across the territory and to ICA's artifact depot in Metaponto, the "Banca," where the participants could interact while



Figure 2. Cesare D'Annibale (foreground, center) discusses coarse ware with Rebecca Ammerman (left) and Lin Foxhall (right) in the "Banca," while Eloisa Vittoria (background, center), Erminia Lapadula, Peter Dana, and Marsha Robbins listen to Smadar Gabrieli lecture on cooking ware.



examining representative samples of the various artifact classes (Fig. 2). Prof. Carter conducted visits to the ICA excavations at Pantanello (Fig. 3) and the Soprintendenza's excavations at ancient Metaponto; there the participants learned about the history of the colony and the monumental sanctuaries that structured the chora.

Over the next three days the contributors made brief presentations of the problems and methods pertaining to their individual fields of expertise in the Centro's newly renovated library/conference room; following each presentation the floor was opened to discussion and comment (Fig. 4). These stimulating discussion sessions led to many important intellectual advances, thanks largely to the accumulated wisdom and critical eye of the three experts.

One of the most productive sessions, on the chronology of the black-gloss pottery and Greek settlement, led to crucial refinements in the method for constructing the histories of individual Greek sites from black-gloss dates, developed by Prof. Carter, Dr. Dana, and Prieto. Profs. Bintliff and Foxhall pointed out the inherent rigidity and arbitrariness of traditional black-gloss chronology, by virtue of which sites appear and disappear in the chora over time based on the earliest and latest

dates of the artifacts; this phenomenon caused sites with small gaps in their otherwise long and continuous histories to appear unoccupied for brief periods. The picture created may not be accurate, since black-gloss chronology is based on arbitrary decisions by scholars, and modern land use is known to interfere with artifact recovery. It is possible that sherds from the "missing" period were present at the site but were simply not available on the surface at the time of survey, or a minor change in the assigned chronology of a piece would fill the "gap." Profs. Bintliff and Foxhall suggested a more flexible interpretation of the dates that would better reflect the inherent uncertainty in black-gloss chronology and artifact recovery. The method has since been revised by allowing the earliest and latest dates to extend further backward or forward in time, and the result is a smoother, more realistic picture of settlement through the centuries that emphasizes continuity of site occupation over interruption (see the following article by Peter Dana).

In addition, participants had the opportunity to examine and critique drafts of the Gazetteer of Sites and the plates containing the artifact illustrations, two of the volume's features that will be most frequently consulted by readers and researchers.



Figure 3. Prof. Joseph Carter (right) recounts the history and excavation of the Pantanello Sanctuary.



The logistics for the seminar were deftly handled by the Centro's administrator, Rosetta Torracco, who arranged lodgings and orchestrated home-cooked meals of local specialties in the recently renovated two-story house, a few steps from the library/conference room which serves as the Centro's office space and residence for visiting researchers and field teams.

The success of the seminar has provided the momentum for finishing the last contributions (prehistoric artifacts and settlement) and for revising the core chapters on analytical methods and settlement in colonial times. Completion of *Archaeological Field Survey I: Bradano to Basento* is expected at the end of 2005.



Figure 4. Participants in the Pantanello conference room discuss a presentation.

Peter H. Dana

*UT Geography*

The initial farm settlement pattern analysis we performed in 2004 used the dates developed for the fine glazed ware known as black gloss. The details of black-gloss fragments are the basis for dating. The types of vessels, the shapes, fabric, and decorations are all used by experts to date fragments. Black-gloss dating is not an exact science nor a perfect art. Most experts assume that any black-gloss date might be in error by 50 years or so.

For this particular study we restricted our analysis to locations (in this case, farmhouses) where dateable black-gloss artifacts have been found. We produced date histograms from the dates given for all the black-gloss artifacts found at each location. Histograms of artifact dates were developed for each location. Each histogram was made up of 10 to 100 black-gloss artifacts, each piece dated by an expert. Dates consist of probable ranges expressed as start-dates and end-dates. A single artifact might have a start-date of 525 BC and an end-date of 425 BC, indicating a probable date of manufacture somewhere in the 100 years between 525 and 425 BC.

From the shapes of these histograms we developed a most likely date of maximum site occupation. Peaks within the histograms were formed by clusters of artifacts with similar date ranges. We evaluated each peak and cluster by computing a kernel density estimate (KDE) from the width and number of artifacts in each cluster: the cluster with

the narrowest date range and most artifacts—the largest KDE value—was selected as the most probable period of maximum occupation. We used this date and other ceramic evidence to model farm site settlement patterns.

In our first attempt at dating locations, we took a simplified view of black-gloss dates. We dated each artifact based on the mid-point for each date range. An artifact with a date range of 525–425 BC was assigned a mid-point date of 475 BC. We built histograms for locations by creating date bins for the 50-year periods between 600 and 100 BC and then summing the number of artifacts with a mid-point date within each bin.

For a sample location such as Site 730 (Figure 1), we have an ensemble of artifacts gathered during the field survey process.

Each black-gloss artifact was given a date range by experts in ceramic dating. Table 1 shows the date range for each black-gloss artifact from Location 730.

The histogram bin for 600 is intended to cover dates from 600 BC up to but not including, 550 BC. Likewise, the 450 bin covers the span from 450 BC up to 400 BC.

Note that the mid-point dates for artifacts 2609, 2624, 2625, 2630, and 2633 place those artifact dates in the 400–350 BC bin, leaving the 450–400 bin empty even though the date ranges of those artifacts fall in that span. (For the resulting histogram, see Fig. 2.)

We used the entire ensemble of these histograms to model settlement patterns over the extent of the Metapontine chora from 600 to 100 BC. We used these histograms to find periods of maximum location occupation and to estimate the changes in the magnitudes of farmhouse influence as suggested by a weighted combination of site scatter size, site scatter density, number of all artifacts, number of black-gloss artifacts, density of roof tiles, and density of other ceramics.



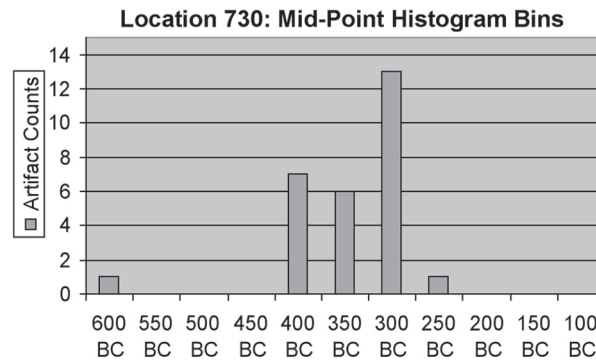
Figure 1. Lin Foxhall examines Location 730.

Artifact #	BEG_DATE	END_DATE	MID POINT
2608	320	300	310
2609	410	375	393
2610	400	350	375
2611	400	300	350
2612	320	280	300
2613	320	280	300
2614	320	280	300
2615	320	280	300
2616	320	280	300
2617	320	280	300
2618	320	280	300
2619	320	280	300
2620	320	250	285
2621	350	270	310
2622	325	270	298
2623	400	350	375
2624	430	350	390
2625	425	300	363
2626	400	300	350
2627	350	300	325
2628	350	250	300
2629	325	250	288
2630	450	350	400
2631	310	150	230
2632	400	300	350
2633	410	300	355
2634	320	280	300
2635	600	550	575

**Table 1. Artifacts from Location 730**

We produced a time series of settlement patterns from this evidence. Figures 3, 4, and 5 show three consecutive date-periods from this settlement pattern analysis.

In September 2004, we met with members of the survey study group to preview our findings and discuss our methods. Three outside referees were brought to this conference at ICA's Pantenello headquarters. These three experts, John Bintliff, Lin Foxhall, and John Robb, were extremely



**Figure 2. Mid-point date histogram bins.**

helpful in many ways, both in their support of some research paths and in their criticisms of others. They all agreed that our use of black-gloss artifacts as a proxy for settlement is reasonable, even though it is a limited approach.

They did, however, object to our over-simplified histograms. Their objection was two-fold. One problem was that incrementing a single 50-year date histogram bin for each individual artifact ignored the additional information about uncertainty expressed in the date range that was created in the original dating process. The other problem was that our temporal sequence could well have holes in it; that is, periods when a location seemed unoccupied if an artifact date was simply mis-estimated by a few years, incrementing one date bin rather than the one next to it.

Upon returning to Austin, we reformulated the method so that histogram bins were incremented for each date bin covered by the span of start- to end-date. To keep the histograms normalized to the number of artifacts, we incremented each date bin in the date span by the reciprocal of the number of spanned date bins. This kept the totals in each bin proportional to the number of artifacts that influenced each bin.

The result was a set of rectangular individual artifact bin shapes, producing far more complex histograms. Figure 6 shows the histogram for Location 730 using the entire date span as a rectangular shape.

The resulting ensemble histograms for each location reflected these rectangular contributions from each individual artifact span. In talking with black-gloss artifact experts we began to see



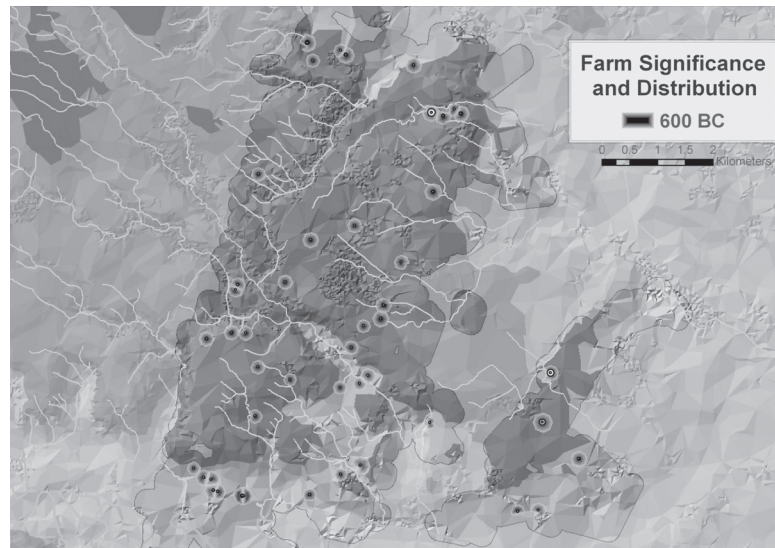


Figure 3: Settlement patterns from mid-point histograms: 600 BC.

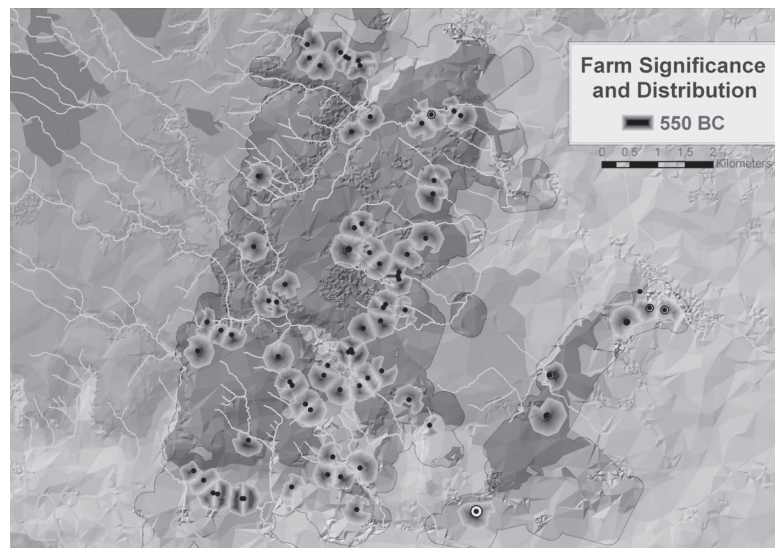


Figure 4: Settlement patterns from mid-point histograms: 550 BC.

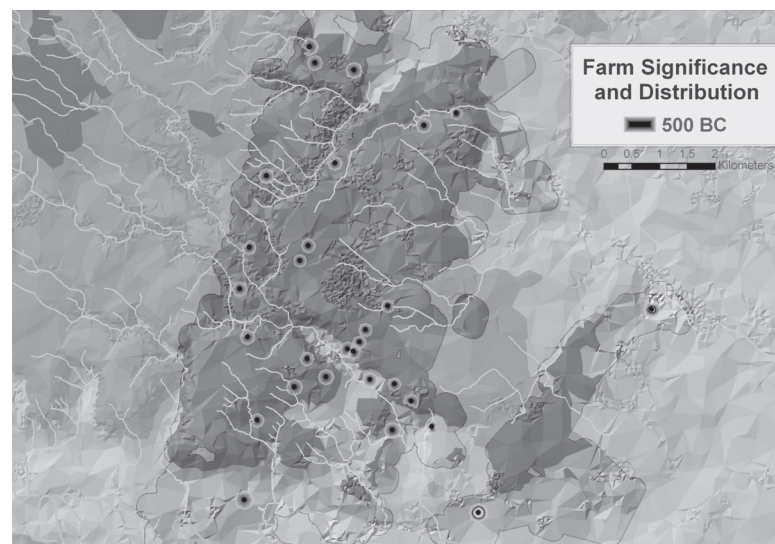


Figure 5: Settlement patterns from mid-point histograms: 500 BC.

that start- and end-dates were not just as likely as dates within the span; the middle of a span was more likely to be the correct date of an artifact’s production.

We met with Dr. Carter, Cesare D’Annibale , and others in the Austin area and showed them the new histograms. Two new ideas surfaced. One was that we should honor the 50-year uncertainty in any black-gloss date by extending the date span by 25 years, both earlier and later. This meant that a single artifact would influence all the 50-year date bins that it probably should influence.

The other idea was weighting the date spans more heavily toward the mid-point with different emphases on the ends. We tried triangular functions with a linear ramp from start- to end-date (Figure 7). Finally we selected a “sine” curve weight based on the shape of a sine wave from 45 to 135 degrees of phase. Black-gloss experts seemed to agree that the sinusoidal weighting was the closest to “what they meant” by a weight span.

Figure 8 shows the sinusoidal date bins for the 28 artifacts found at Site 730.

We redid our location histograms. Figure 9 shows the smoother and more complex histogram for the artifacts from Location 730.

When we reproduced our temporal settlement sequence for the ensemble of sites, settlement patterns changed less between periods, reflecting the new “meaning” assigned to black-gloss artifacts and their weights. Figures 10, 11 and 12 show the result of the new sinusoidal weighting incorporated into the final cost-weighted analysis of settlement patterns.

Without the advice of experts, both from within and from outside of the project team, the initial GIS analysis reflected oversimplified and less realistic ideas about artifact weights. This is just one example of the collaborative effort behind the sometimes too-persuasive GIS displays that are all too easy to produce.

We look forward to suggestions and criticism from knowledgeable researchers from many different fields. Spatial analysis can only be as good as the ideas embodied in the design of the analysis steps. We are particularly indebted in this case to Drs. Bintliff, Foxhall, and Robb, who were able to impact this one issue in particular as well as influence many other analysis decisions.

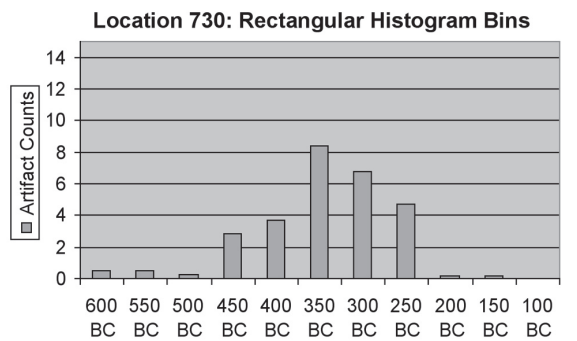


Figure 6. Rectangular histogram bins.

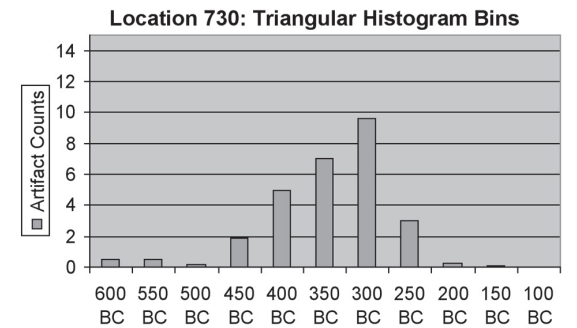


Figure 7. Triangular histogram bins.

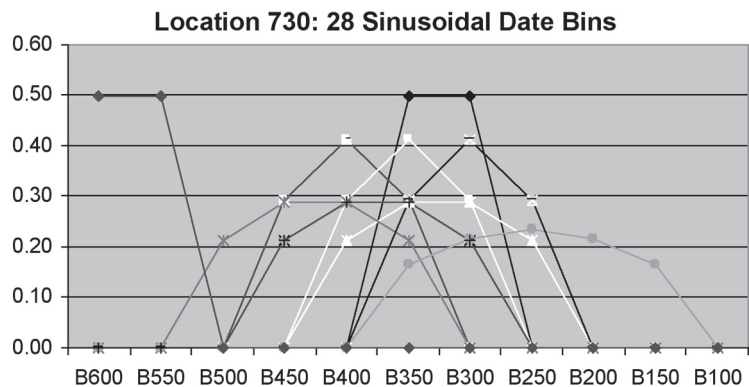


Figure 8. Sinusoidal date bins.

Figure 9. Sinusoidal histogram bins.

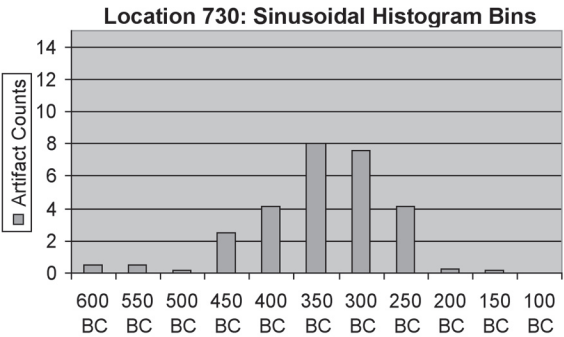


Figure 10. Settlement patterns from sinusoidal histograms: 600 BC.

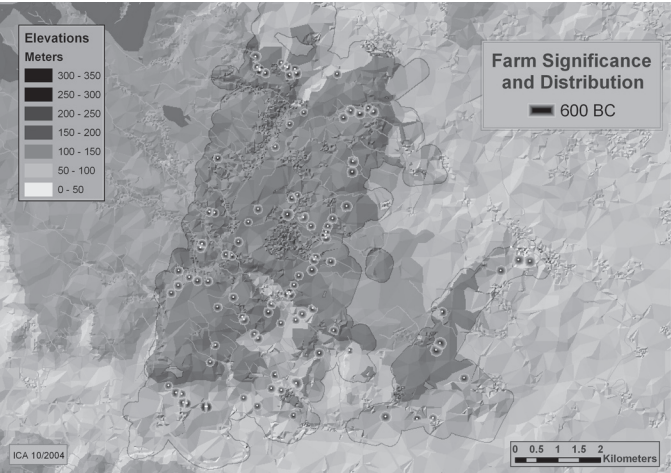


Figure 11. Settlement patterns from sinusoidal histograms: 550 BC.

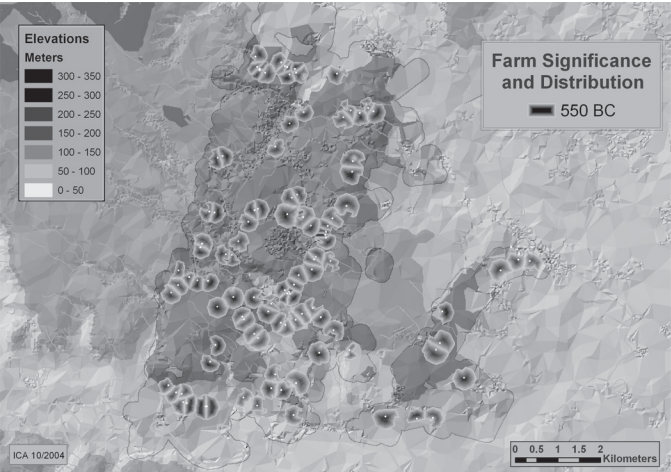
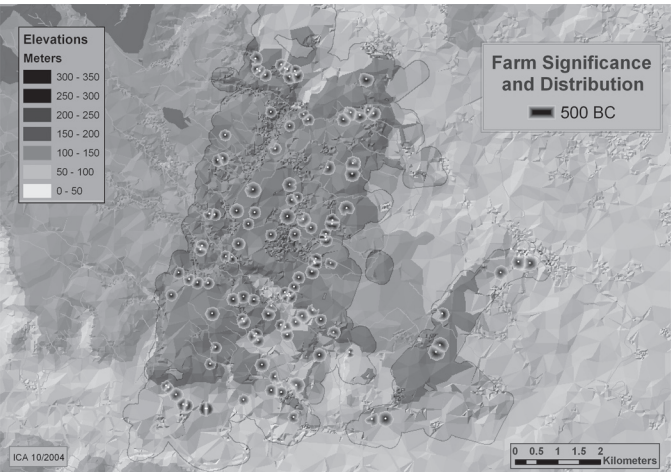


Figure 12. Settlement patterns from sinusoidal histograms: 500 BC.





## ACTIVITIES AT THE CENTRO DI AGROARCHEOLOGIA, PANTANELLO

Rosetta Torraco  
*Pantanello Administrator*

In 2004 the Centro di Agroarcheologia at Pantanello was fully functional in all of its capacities, following the completion of the renovations that have occupied the previous four years. The Centro's two on-site researchers, Cesare Raho and Eloisa Vittoria, continued the documentation and study (both analytical and visual) of the materials accumulated in 30 years of excavation and survey. In May and June illustrator Valerie Woelfel made drawings of ceramic profiles for the plates of the survey volume currently in preparation, and Chris Williams came to Metaponto to perform some of the photographic work. Smadar Gabrieli worked on her chapter on Greek and Roman cooking wares at the Centro between August and October, while Marsha Robbins finished her research on the transport amphorae in October.

The Centro and Prof. Carter were involved in the 39th International Conference on the History of Medicine (September 3-6), an important conference held at Bari under the direction of Prof. Alfredo Musajo Somma, Chief of Plastic Surgery at Bari General Hospital. Long-time ICA collaborators Profs. Maciej and Renata Henneberg gave a keynote presentation on their work with the skeletal remains recovered in the chora of Metaponto by ICA.

For this occasion the Centro hosted Profs. Alain Touwaide and Emanuela Appetiti of the Department of Botany in the Smithsonian Institution, Washington, D.C., as well as four Israeli students of the history of medicine from Ben Gurion and Tel Aviv Universities (Efraim Lev, Ravid Kerner, Jammy Soffer, and Keven Abbon).

The Centro also served as the site of the Conference's final day, accommodating the 400 attendees from 40 countries. The presentations were held in the conference hall of the Azienda Pantanello, thanks to the generous collaboration of the Azienda's director, Carmelo Mennone, who also spoke about the experimental farm's agricultural projects. At the end of the day those who were interested visited the ICA excavation sites at Pantanello, the Greek sanctuary and Roman kilns. The Italian press gave extensive coverage to the event: the Hennebergs were interviewed by the prestigious national newspaper *Il Corriere della Sera*.

From September 29 to October 2 the Centro hosted the ICA seminar on the Metaponto survey project, which brought together several professional archaeologists and all contributors to the first survey volume (see the chapter by Prieto). For this occasion the regional newspaper *La Gazzetta del Mezzogiorno* sent the journalist Grazia Tantalo to write an article based on an interview with the author.

## CHERSONESOS

### 2004 Fieldwork

Joseph Coleman Carter, Director, ICA, and Classics, UT Austin

Adam Rabinowitz, Field Director, ICA, and Classics, UT Austin

#### *Chersonesos Coordinators*

Taissa Bushnell, On-site Coordinator, ICA

Director, Pidtrymka Chersonesu

Asele Surina, Coordinator of Special Projects, ICA

#### *Kyiv Coordinator & Translator*

Svetlana Telenkova

#### *ICA Administration in Austin*

Carol K. Cook

### NATIONAL PRESERVE OF TAURIC CHERSONESOS (NPTC)

Leonid Marchenko, General Director

Galina Nikolaenko, Deputy Director for Research

Larissa Sedikova, Deputy Director for Conservation

Ludmila Grinenko, Head Librarian

Stanislav Ryzhov, Head of Architecture & Archaeology

Tatiana Yashaeva, Head of Medieval Department

Nikolai Alekseenko, Head of Cembalo & Kalamita Branch

Oleg Savelya, Deputy Director for Protection of Outlying Monuments

### EXCAVATIONS

#### Ancient City

Larissa Sedikova, NPTC

Adam Rabinowitz, ICA

(Co-directors)

Kate Culpepper

Marjolijn De Puydt

Alla Lazareva

Shawn Marceaux, UT Austin

Allyson McDavid, UC Berkeley (architect)

Marina Montano

Clay Schultz, UT Austin

Sam Wood

*from Kyiv Mohyla University:*

Stanislav Andriychuk

Olena Fedorchenko

Irina Fadeeva (translation)

Taras Korostyl'ov

Roman Reyda

Anton Smirnov

*from Simferopol:*

Evgeniy Balabai

Andrei Belyavskiy

Anna Borisova

Dmitry Davydov

Anton Dushenko

Aleksandr Kuzmin

Karina Osipenko

Anna Smakotina

Yuriy Utrobin

#### Bezmyannaya

Galina Nikolaenko, NPTC (Director)

Phil Freeman, U. of Liverpool (Field director)

Karissa Basse

Maria Berg

Kate Culpepper

Sergei Demyanchuk

Marjolijn De Puydt

Sara Falkstad

Klaus Hvid

Lorraine McEwan

Katia Motsia

*from Kyiv Mohyla University:*

Stanislav Andriychuk

Taras Korostyl'ov

Roman Reyda

Anton Smirnov

## CHERSONESOS 2004

### CONSERVATION

Chris Cleere, Managing Director, Cleere Conservation Ltd., London  
(Conservation project director)

Semih Ercan, Katholieke Universiteit, Leuven, Belgium

#### Church Mosaic

Duygu Cleere, Inst. of Archaeology, U. College, London

#### Storage Survey

*from Museum of London Special Services:*

Robert Howell (Director)

Elizabeth Barham

Elizabeth Goodman

#### Site Survey

Andy Holbrock

Fred Van der Walle

#### Site Conservation

Jonathan Kemp

Rachel Mikeska

Julian van Rensburg, U. of Southampton

Sarah Scullin

Erin Sims

Larisa Novitska (translation)

#### Object Conservation

Cathy Daly

Dana Goodman-Brown

Regine Kunz

Urs Lang

Steve Miller

Vanessa Terrapon

Natasha Streltsova (translation)

#### Stelai Conservation

Jonathan Kemp

Regine Kunz

Urs Lang

Erin Sims

Vanessa Terrapon

### ARTIFACT STUDIES

#### Ceramic Analysis

Dr. Andrei Opait, Toronto

(Greek, Roman and medieval pottery)

Karissa Basse

Alla Lazareva

Mariann Micsinai

Evelina Kravchenko, Inst. of Archaeology, Kyiv

(Prehistoric pottery)

Yulia Miroshnichenko (translation)

#### Stelai Research

Dr. Richard Posamentir, DAI, Istanbul (Director)

Alla Buyskykh

Iris Engelmann

Christina Lippert

Andreas Schanze

#### Lithic Analysis

Dottsa. Eugenia La Rosa, U. of Rome

### SURVEY AND GIS

Jessica Trelogan, ICA (Co-director)

Stuart Eve, Inst. of Archaeology, U. College, London (Co-director)

Flint Dibble, U. of Pennsylvania

Lesley Kadish, UT Austin

Alexander Makovics, Cultural Resources Analysis, USA

Dott. Alessandro Rizzo, U. of Lecce

Viktor Samoilenko, NPTC

### MUSEUM COMPUTERIZATION AND ARCHIVAL PRESERVATION (MEGARIKA PROJECT)

Glenn Mack, ICA (Coordinator)

Nonna Krasovskaya, Head Archivist, NPTC

Tatiana Dianova, Archivist, NPTC

Robin Howard, UT Austin (Archives)

Emily Rainwater, UT Austin (Library)

Tanya Shevchenko, Kyiv Mohyla (Journal)

Alexander Semenov, Pidtrymka Chersonesu (Team leader)

Andrei Kondyuk, Pidtrymka Chersonesu (Lead Scanner)

Olga Kondyuk, Pidtrymka Chersonesu (Book conservation)

Dimitri Krivonos, Pidtrymka Chersonesu (Web development)

Alexei Romanov, Pidtrymka Chersonesu (System administrator)



## CHERSONESOS 2004

### SPECIAL PROJECTS

#### **Zooarchaeology**

Dr. Aleksey Kasparov, Inst. of History of Material  
Culture, St. Petersburg

Natalya Rashevskaya (assisting Dr. Kasparov)

Dr. Oleg Zhuravlev, Institute of Archaeology  
of the National Academy of Sciences of  
Ukraine

Lesya Kirichenko (assisting Dr. Zhuravlev)

#### **Paleobotany**

Dr. Galina Pashkevich, Institute of Archaeology  
of the National Academy of Sciences of  
Ukraine

Lesya Kirichenko (assisting Dr. Pashkevich)

#### **Physical Anthropology**

Dr. Renata Henneberg

Denis Ponomarev

#### **World Heritage Application**

Henry Cleere, Honorary Professor, Institute of  
Archaeology, U. College, London

Giora Solar, Treasurer General, ICOMOS

### **PHOTOGRAPHY AND DRAFTING**

Chris Williams, ICA (Photography)

Aleksei Los, Sevastopol (Additional photography)

Valerie Woelfel, St. Paul, MN (Artifact illustration)

Olga Andreeva, NPTC (Artifact illustration)

### **LOGISTICAL SUPPORT**

Vasily Kirichenko, Kyiv (Majordomo)

Sergey Kossseykin, Simferopol (Transportation, supplies)

Marina Krotova, Sevastopol (Logistics, translation)

Irina Fadeeva, Sevastopol (Translation)

Oksana Sukach, Sevastopol (Chief cook)

Raissa Tychinskaya, NPTC (Housekeeping)

### **ACCOUNTING, LEGAL, AND BANKING**

Elena Baryshnikova, MBA, Lex Service, Sevastopol

Ekaterina Kruchinina, Lex Service, Sevastopol

Elena Filipova, Lex Service, Sevastopol

Grigoriy Lutsai, Director, Sevastopol Branch,

State Import-Export Bank of Ukraine

Irina Mizyak, Lex Service, Sevastopol

## **METAPONTO**

### **2004 Study Season**

#### **ADMINISTRATION**

Rosetta Torracco, Bernalda, Italy

#### **ARTIFACT STUDY**

Dr. Rebecca Miller Ammerman, Colgate U. (Terracotta figurines)  
Cesare D'Annibale, Parks Canada (Prehistoric materials, Greek coarse ware)  
Dr. Gianna Ayala, U. of Sheffield (Prehistoric sites and materials)  
Smadar Gabrieli, Sydney (Cooking ware)  
Erminia Lapadula, U. of Lecce (Roman and Medieval ceramics)  
Cesare Raho, U. of Lecce (Photography and illustration)  
Marsha Robbins, U. of Southampton (Transport amphorae)  
Eloisa Vittoria, U. of Lecce (Black-gloss, gray ware, coarse ware studies)  
Chris Williams, ICA (Artifact photography)  
Valerie Woelfel (Artifact illustration)

#### **FIELD SURVEY STUDY**

Cesare D'Annibale, Parks Canada (Co-director)  
Alberto Prieto, ICA (Co-director)  
Dr. Peter Dana, UT Geography (GIS advisor)

---

#### **SENIOR ADVISORS**

Neal Ascherson, Editor, Public Archaeology, London  
Yuri Bohutsky, Minister of Culture and Arts of Ukraine  
Dr. Henry Cleere, World Heritage Coordinator, ICOMOS, United Kingdom  
Evnika Linyova, Department for the Preservation of Cultural Heritage, Ministry of Culture and Arts of Ukraine  
Ambassador William Green Miller, Former US Ambassador to Ukraine, 1993–1997  
Leonid Novokhatko, Deputy State Secretary, Ministry of Culture and Arts of Ukraine  
Brooke Shearer, Cultural Resource Management Consultant, Washington, D.C.  
Academician Petro Tolochko, Director, Institute of Archaeology, Vice President of the Ukrainian National Academy of Sciences  
Prof. Leonid Zaliznyak, the University of Kyiv Mohyla Academy  
Prof. Vitaly Zubar, The University of Kyiv-Mohyla Academy

PUBLICATIONS, TALKS AND PAPERS BY  
ICA STAFF AND COLLABORATORS

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Department of Archaeology Seminar Series.  
March 17.
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Department of Archaeology Seminar Series.  
March 17.
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Environment* and other works by Tim Ingold.  
Seminar organized by the Society for Portuguese  
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Americans, 1673–1683: A decade of change.”  
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Forum, The Alamo, San Antonio, Texas.
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of the east Texas and Louisiana Caddo groups.”  
Organizer, Chair and Presenter. Paper: “Casanas,  
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INSTITUTE OF CLASSICAL ARCHAEOLOGY

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DIRECTOR

Dr. Joseph Coleman Carter

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Dr. Adam Rabinowitz

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CHERSONESOS PUBLICATIONS AND  
TECHNICAL DEVELOPMENT

Glenn Mack

DEVELOPMENT

Asele Surina

PUBLICATIONS EDITOR

Christopher Williams

RESEARCH ASSOCIATES

*Publications*

Dr. Mariah Wade, UT Anthropology  
(Chora of Metaponto, Sanctuary)

Alberto Prieto, Ph.D. candidate, UT Classics/ICA  
(Chora of Metaponto, Survey)

Dan Davis, UT Classics/ICA  
(Chora of Metaponto)

Dr. Amy Papalexandrou  
(Chersonesos ceramics)

*Remote Sensing and GIS, Chersonesos*

Jessica Trelogan

*Geomorphology*

Paul Lehman, Ph.D. candidate, UT Geography

STUDENT ASSISTANTS

*Photographic archives*

Elizabeth Taylor Bose

Sarah Davies

John Hopkins

Deanna Mellican

*Metaponto Ceramics Project*

Renee Dragoset

Lisa Kraus

Roz Mandola

Jeffrey Taff

*Centro di Agroarcheologia Pantanello, Metaponto*

ADMINISTRATION

Rosetta Torraco

OPERATIONS

Cosimo D'Anzi, Cooperativa Pantanello  
(Maintenance of archaeological site)

Rocco Torraco, Azienda Pantanello  
(Technical support)

*Pidtrymka Chersonesu, Sevastopol*

DIRECTOR

Taissa Bushnell

ADMINISTRATION

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ISBN 0-9748334-1-X

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